

**System Audit of the Ambient Monitoring Program:
California Air Resources Board
June - September, 2011**

Conducted by:

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Air Division**

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GLOSSARY OF ACRONYMS

ADAM.....	Aerometric Data And Management
AMNS.....	Air Monitoring Northern Section
AMSS.....	Air Monitoring Southern Section
APCD.....	Air Pollution Control District
AQAS.....	Air Quality Analysis Section
AQDA.....	Air Quality Data Action
AQDAS.....	Air Quality Data Acquisition System
AQDB.....	Air Quality Data Branch
AQMD.....	Air Quality Management District
AQS.....	Air Quality System
AQSB.....	Air Quality Surveillance Branch
ATP.....	Acceptance Test Procedure
BAM.....	Beta Attenuation Mass Monitor (continuous PM _{2.5})
CAA.....	Clean Air Act
CARB.....	California Air Resources Board
CBSA.....	Core-based Statistical Area
CO.....	Carbon Monoxide
CoC.....	Chain of Custody
CFR.....	Code of Federal Regulations
DQO.....	Data Quality Objective
EC.....	Elemental Carbon
EPA.....	Environmental Protection Agency
FEM.....	Federal Equivalent Method
FRM.....	Federal Reference Method
GPS.....	Global Positioning System
ICAPCD.....	Imperial County APCD
IZS.....	Internal Zero/Span
LC.....	Local Conditions
LIMS.....	Laboratory Information Management System
MCAQMD.....	Mendocino County AQMD
MFE.....	Mass Flow Element
MLD.....	Monitoring and Laboratory Division
MSA.....	Metropolitan Statistical Area
NAAQS.....	National Ambient Air Quality Standard
NCore.....	National Core multi-pollutant monitoring stations

NELAC.....	National Environmental Laboratory Accreditation Conference
NIST.....	National Institute for Standards and Technology
NLB.....	Northern Laboratory Branch
NPAP.....	National Performance Audit Program
O ₃	Ozone
OC.....	Organic Carbon
OPAS.....	Operations, Planning, and Assessments Section
OSS.....	Operations Support Section
PAMS.....	Photochemical Assessment Monitoring Stations
Pb.....	Lead
PEP.....	Performance Evaluation Program
PM.....	Particulate matter
PM _{2.5}	Particulate matter 2.5 microns or less in aerodynamic diameter
PM ₁₀	Particulate matter 10 microns or less in aerodynamic diameter
POC.....	Parameter Occurrence Code
PQAO.....	Primary Quality Assurance Organization
PTSD.....	Planning and Technical Services <u>Support</u> Division
QA.....	Quality Assurance
QAPP.....	Quality Assurance Project Plan
QAS.....	Quality Assurance Section
QC.....	Quality Control
QMB.....	Quality Management Branch
QMP.....	Quality Assurance Project Plan
RH.....	Relative Humidity
SJVAPCD.....	San Joaquin Valley APCD
SLAMS.....	State or Local Air Monitoring Station
SOP.....	Standard Operating Procedure
SPM.....	Special Purpose Monitor
SO ₂	Sulfur Dioxide
STP.....	Standard Temperature and Pressure
TAD.....	Technical Assistance Document
TSA.....	Technical System Audit
TSP.....	Total Suspended Particulate
VOC.....	Volatile Organic Compound

EXECUTIVE SUMMARY

This document is a report on the findings made by EPA while conducting a Technical Systems Audit (TSA) on the air monitoring program of the California Air Resources Board (CARB). A TSA is an on-site review and inspection of a state or local ambient air monitoring program to assess its compliance with established regulations governing the collection, analysis, validation, and reporting of ambient air quality data. This TSA meets the requirements for EPA audits of CARB's monitoring organization as described in 40 CFR Part 58, Appendix A, Section 2.5.

CARB, part of the California Environmental Protection Agency, is the governmental agency delegated under State law with the authority and responsibility for collecting ambient air quality data as directed by the Clean Air Act of 1977 and Clean Air Act Amendments of 1990. CARB and local air pollution control districts (hereafter referred to as "local districts") operate ambient monitoring stations throughout the State. CARB is designated as the Primary Quality Assurance Organization (PQAO) for the entire State with the exception of the ambient air monitoring programs of the Bay Area Air Quality Management District, the South Coast Air Quality Management District, and the San Diego County Air Pollution Control District. Many of the smallest local Districts do not have active air monitoring programs and rely solely on CARB for the operation of monitoring stations within their jurisdictions.

The TSA was conducted by EPA Region 9 staff from June - September, 2011. However, the audit itself evaluates all air monitoring activities from month, 2010 (when Arvin Moved?? It is mentioned several times) to . The audit team interviewed management and staff on specific aspects of the ambient air monitoring program including network design, field operations, laboratory operations, data handling, quality assurance and quality control procedures. The audit team also inspected some of the monitoring sites operated by CARB. The site inspections consisted of an interview with the site operator (when possible), review of station and instrument logbooks, and evaluation the station siting with respect to EPA requirements for probe siting (40 CFR 58, Appendix E). The laboratory inspection included a review of the particulate matter program for mass determinations, laboratory analysis for volatile organic compounds (VOC), OC/EC, hexavalent chromium, and carbonyl sample analysis.

Since CARB oversees the quality assurance of data collected by local districts within the CARB PQAO, we also reviewed field operations, data management and quality assurance activities at local districts. For this TSA, it was not possible for EPA to evaluate all of the 22 local districts that collect ambient air quality data; therefore, the EPA audit team reviewed operations at three local Districts, the San Joaquin Valley Air Pollution Control District, the Imperial County Air Pollution Control District, and the Mendocino County Air Quality Management District. The local districts included in the CARB PQAO have their own organizational structures and these will vary depending on the size of the local district program. The San Joaquin Valley Air Pollution Control District was chosen for review because it is the largest local district in the CARB PQAO and has the most significant air quality issues. Imperial County Air Pollution Control District was chosen as an example of a medium size organization and also because of the unique air quality problems that exist in that air basin. Finally, the

Comment [A1]: This number is not consistent through document. Should be 21

Mendocino County Air Quality Management District was chosen to be representative of the small districts.

The TSA is one of the ways that EPA provides oversight to ensure that data collected by state, local, and tribal agencies meets certain minimum data quality objectives. Other assessments such as network reviews and performance evaluations are also used to collect information on the overall quality of ambient air monitoring data. These assessments also enable agencies to identify and correct those program elements which may be adversely affecting the quality of ambient air data. The results of the TSA are summarized here and fully described in this report, along with recommended actions to address the findings. The specific actions to be taken by CARB will be determined through negotiations between EPA and CARB and will be documented in a corrective action plan prepared by CARB.

EPA would like to thank all the staff and management of CARB for their support and cooperation during the audit.

A. Program Strengths:

- CARB has extensive experience and expertise in ambient air monitoring
- CARB operates a robust audit program which benefits the entire State of California
- Local districts within the CARB PQAO are committed addressing air quality concerns in their areas and see monitoring as an important tool.
- CARB and the local districts that were included in this TSA are dedicated to collecting credible and defensible air quality data.
- CARB has developed good infrastructure for conducting ambient air monitoring.

B. Program Major Findings:

- CARB should complete the process of formalizing its status as a PQAO. [Finding G1]
- The QA Management Branch does not have the structure and sufficient staff to manage QA oversight of the PQAO districts. [Finding G2]
- While progress has been made on updating the CARB QA Manual with a QMP and QAPPs or equivalent documents, the process is behind schedule and is not moving forward. [Finding G3]
- Local districts within the CARB PQAO do not always have updated quality system documentation for all activities. [Finding G4]
- Coordination between CARB and districts (e.g., Imperial County, SJV, and Mendocino County) and EPA needs to be improved. [Finding G6]
- Not all agencies within the PQAO have an approved network plan. The current network plan process does not allow for determination of network adequacy. [Finding NM1]
- Field sites are operated inconsistently at both CARB and non-CARB sites throughout the PQAO. [Findings FO1-8, IMP5-8, MEN4-10, SJV5-8)
- Data within the CARB PQAO are not validated using consistent procedures. (Findings DM2, SJV9, IMP10, and MEN11)
- There are numerous deficiencies in the data certification process for the CARB PQAO, including:
 - Not all NAAQS-compliant data within the CARB PQAO are routinely certified.

Comment [A2]: The process is moving forward. A draft should be ready by July 2012.

- Data certified by CARB for local districts are not reviewed by CARB and are not validated.
- Data are routinely certified by local agencies but responsibility has not been formally delegated to any local agencies within the State of California.
[Finding DM6]

- Data uploaded ~~by~~ for local districts by CARB's Air Quality Analysis Section are not consistently validated. Erroneous data has been entered into AQS. [Findings DM5, IMP10, MEN11]

The individual findings are reported in the topic sections of this document and are also summarized in Appendix A.

TSA ACTIVITIES

In the summer of 2011, EPA Region 9 conducted a Technical System Audit (TSA) of the ambient monitoring program operated by and overseen by CARB. EPA staff interviewed management and staff in three branches of CARB Monitoring and Laboratory Division (MLD) and one branch of the Planning and Technical Support Division (PTSD). The TSA covered the areas of Air Monitoring Network Management, Field Operations, Laboratory Operations, Data and Data Management, and Quality Assurance. In addition, the EPA staff reviewed these same areas as implemented by three local districts: the San Joaquin Valley Air Pollution Control District, the Imperial County Air Pollution Control District, and the Mendocino County Air Quality Management District.

CARB managers and staff were very accommodating to the EPA audit team, making themselves and their staff available for many interviews, procedural reviews and monitoring site visits. Branch Chiefs interviewed were:

Ken Stroud – Chief, Air Quality Surveillance Branch (AQSB), MLD
Michael Miguel – Chief, Quality Management Branch (QMB), MLD
Cindy ~~Castranovo~~ Castronovo – Chief, Northern Laboratory Branch, MLD
Karen Magliano – Chief, Air Quality Data Branch (AQDB), PTSD

Many other individual section managers and staff were interviewed in Sacramento and in the field. We appreciate the fact that CARB gave the EPA audit team access to all key personnel involved in the collection and quality assurance of ambient air quality data.

The EPA regional staff members conducting the TSA were Elfego Felix, Michael Flagg, Katherine Hoag, Meredith Kurpius, and Gwen Yoshimura of the EPA Region 9's Air Quality Analysis Office, and Mathew Plate and Steve Remaley of the EPA Region 9 Quality Assurance Office. In addition to the EPA Audit Team, Matthew Lakin and Eugenia McNaughton, respectively Managers of EPA Region 9's Air Quality Analysis Office and Quality Assurance Office, attended the opening and closing meeting representing EPA management.

The TSA began with a general meeting with CARB managers and staff on June 7, 2011 at the Monitoring and Laboratory Division office in Sacramento, CA and continued during the months of June, July, August, and September, 2011. The TSA covered the following program areas:

- General / Quality Management
 - Program organization
 - Facilities
 - Independent quality assurance and quality control
 - Planning documents (including QMP, QAPPs, & SOPs)
 - General documentation policies
 - Training
 - Corrective action
 - Quality improvement
 - External performance audits
- Network Management / Field Operations
 - Network design

- Changes to the network since the last audit
- Proposed changes to the network
- Field support
- Laboratory Operations: toxics and particulate matter
 - Routine operations
 - Quality control
 - Laboratory preventive maintenance
 - Laboratory record keeping
 - Laboratory data acquisition and handling
 - Specific pollutants: PM₁₀, PM_{2.5}, and toxics
- Data and Data Management
 - Data handling
 - Software documentation
 - Data validation and correction
 - Data processing
 - Internal reporting
 - External reporting

As part of the TSA, EPA tracked supporting documentation for data points/sets from calendar year 2010.

This report is divided the following sections:

- Executive Summary – describes the purpose of the TSA and summarizes the major findings.
- TSA Activities – outlines the timing of this TSA and the programs that were covered.
- Overview of Air Monitoring Program – describes the District’s Air Monitoring Program.
- Findings – collection of findings and recommendations that includes details associated with findings.
- Appendix A – list of findings.
- Appendix B – CARB organizational charts.
- Appendix C – CARB data validation procedures.

The findings and recommendations in this report are grouped by program area. Recommended actions to address findings are provided to give some indication of EPA’s expectations. If CARB or local districts have other approaches or alternatives to address the concerns identified, EPA will consider them, provided the corrective action adequately addresses the finding.

Network Management

EPA interviewed Karen Magliano, Gayle Sweigert and Pheng Lee, and reviewed CARB’s Annual Network Plan and Annual Network Assessment as part of this TSA. The most recent Annual Network Plan was submitted in July, 2011. CARB submitted a five-year Annual Network Assessment as required by 40 CFR 58.10. Both documents address a portion of the monitoring network of California: they present information from the smaller agencies that do not produce their own reports as well as CARB sites. While both documents include the information that is required per CFR, and were approved in 2010 and 2011 as meeting all of the requirements for annual network plans, based on EPA’s review of over 100 network plans since 2007, the

current structure does not allow for a determination of network adequacy or robustness of state-level network planning. To review network adequacy, EPA reviewed all the network plans available for the CARB PQAQ, in addition to site lists that EPA has compiled. We have reviewed the SLAMS monitoring network for the CARB PQAQ and have determined that the network is adequate for all areas within the CARB PQAQ.

Field Operations

Three CARB site technicians interviewed were Jaspreet Gosal, Bob Land, and Rick Rigsby. All demonstrated a thorough knowledge of the monitoring equipment they were responsible for operating.

Comment [A3]: Not an ARB employee

We visited five of CARB's monitoring stations (Colusa, Sutter Buttes, Tuscan Buttes, Willows, and Yuba City). A more thorough evaluation was performed at Colusa, Willows, and Yuba City. Our evaluation at these sites included inspection of the inlet manifolds, examination of station and instrument log books, and an evaluation as to whether appropriate QC checks and QA audits were being performed. All visible inlet manifolds appeared to be clean. Station logbooks and instrument logbooks were not consistently used, and entries often did not follow a formal protocol. Some QC checks were not being consistently recorded, and problems were not systematically documented. Generally we found that the station operators were very knowledgeable, but recordkeeping, corrective action, training, and oversight could be improved.

On June 27, 2011 EPA conducted a review of CARB's instrument testing, certification, and repair procedures. During the review, EPA had the opportunity to interview CARB's Operation Support Section Manager, Reggie Smith, as well as visit the instrument laboratory and stockroom for spare parts (both located at the CARB MLD buildingMain Laboratory). In general, considering the extent of the CARB's network, EPA found that the agency maintains an excellent instrument testing, certification, and repairs program. Some improvements could be made to track malfunctioning equipment so that they may be repaired and reinstalled, so offline time is reduced

Data Management

This section covers data management for criteria pollutants (O₃, CO, NO₂, SO₂, PM_{2.5}, and PM₁₀); non-criteria pollutant data are addressed in the laboratory section. The following managers/staff who have data management responsibilities were interviewed Their respective areas of review are noted in parentheses):

Norma Montez (Air Pollution Specialist, data validator for continuous data for CARB northern sites)

Gayle Sweigert (AQS data entry for non-CARB sites; data certification)

Pheng Lee and Dwight Oda (AQS data entry for non-CARB sites; data certification)

Michael Werst (PM filter data)

Comment [A4]: All CARB sites

Quality Assurance/Quality Control

EPA interviewed the MLD Quality Management Branch Chief, MLD Air Quality Surveillance Branch Chief, Quality Assurance Section (QAS) Manager, Operations Planning and Assessment Section Manager, Air Monitoring North Section Manager, and staff in the Quality Assurance Section. EPA evaluated a QAS performance audit and site evaluation at the Yuba City

monitoring site. EPA interviewed staff of and reviewed procedures for the CARB Standards Calibration Laboratory.

CARB's quality management system meets the basic EPA requirements. CARB has a QA Manual that has been approved and is currently being updated. CARB's core program conforms to or exceeds the method quality objectives systematically developed by EPA for criteria pollutants. EPA and CARB perform national performance and technical evaluations of the monitoring network.

Managers/Staff interviewed included:

Mike Miguel, QMB Chief

Ken Stroud, AQS Chief

Merrin Wright, QAS Manager

Joe Guerrero, Air Monitoring North Section (AMNS) Manager

Jeff Wright, Operations Planning and Assessments Section (OPAS) Manager

Chris Deidrick, QAS Staff

Hien Tran, QAS Staff

Patrick Rainey, QAS Staff

Harnek Nijjar, QAS Staff

Particulate Matter Laboratory

EPA visited two separate gravimetric particulate matter laboratories and interviewed the following staff as part of the audit: Michael Werst, Inorganic Laboratory Section Manager, Ranjit Ahuja, lead PM₁₀ laboratory technician, Brenda Saldana, lead PM_{2.5} laboratory technician, and Michelle Fristoe, backup PM_{2.5} laboratory technician. While the laboratory facilities are primarily used to process and weigh PM₁₀ and PM_{2.5} filters, back-up PM₁₀ and PM_{2.5} balances are maintained at both facilities so that filters may be weighed in either laboratories if issues arise at the primary laboratory location. Both of the particulate matter laboratories were well-maintained, neat, and well-organized. Generally, the PM₁₀ and PM_{2.5} laboratory measurements are performed with very good technical expertise.

Comment [A5]: These staff are Air Pollution Specialists

Toxics Laboratory Operations

The analysts/chemists were found to be knowledgeable, skilled, and dedicated. CARB's laboratory is in compliance with respect to performing analyses according to EPA methods in most areas of the laboratory. Analysts working on the following programs were interviewed as part of this TSA.

Quality Assurance:

All the laboratory staff and managers were asked about quality assurance in the laboratory. The laboratory does not have a dedicated QA officer, but most method quality assurance activities are being routinely done throughout the individual departments. Some corrective actions were observed from the previous TSA, and there were some repeat findings. Staff appeared very receptive to QA findings and suggestions.

Canister Cleaning - ~~MLS~~-MLD 020:

Sample Custodian ~~Julia~~ Judy Hodgkins was interviewed. Canister cleaning is generally being performed adequately in accordance with accepted protocols. Findings in this department mostly focused on outdated SOPs that do not reflect current procedure. Procedures to improve quality assurance were discussed.

Comment [A6]: Staff title is Air Pollution Specialist

Carbonyls Department - MLD 022:

John Medina is an analyst with many years of analytical experience but is new to carbonyls analysis. Some deviations from method and CARB protocols were identified.

Hexavalent Chromium - MLD 039:

Howard ~~Bakes~~ Bakes is responsible for the hexavalent chromium analysis. These analyses are generally being performed according to established protocols. The peer review process described was exemplary.

Aromatic and Halogenated Compounds - MLD 066 & Oxygenated Hydrocarbons and Nitriles (MLS 058):

Steve Madden and John Bricarello were interviewed. These methods were developed by CARB and are generally performed according to protocol. Some opportunities to improve documentation were identified.

Review of Agencies within the CARB PQAQ

Since CARB oversees the quality assurance of data collected by local Districts¹ within the CARB PQAQ, we also reviewed field operations, data management and quality assurance activities at local Air Pollution Control Districts. As it was not possible to evaluate all of the 20 local districts within the CARB PQAQ that collect ambient air quality data, the EPA audit team reviewed operations at three local districts: San Joaquin Valley Air Pollution Control District, Imperial County Air Pollution Control District, and Mendocino County Air Quality Management District.

Comment [A7]: Number not consistent; see footer below as well. Should be 21

Each of the local districts included in the CARB PQAQ has its unique organizational structures. The San Joaquin Valley Air Pollution Control District was chosen for review because it is the largest local district in the ARB PQAQ and has the most significant air quality issues. Imperial County Air Pollution Control District was chosen as an example of a medium size organization and also because of the unique air quality problems that exist in that air basin. Finally, the Mendocino County Air Quality Management District was chosen to be representative of the small districts.

¹ According to the California State and Local Air Monitoring Network Plan - 2011, prepared by the CARB's Planning and Technical Support Division, Air Quality Data Branch, 20 local Districts operate air monitoring stations in the CARB PQAQ.

OVERVIEW OF THE STATE AIR MONITORING PROGRAM

State and Local Monitoring Agencies within the State of California

CARB, part of the California Environmental Protection Agency, is the governmental agency delegated under State law with the authority and responsibility for collecting ambient air quality data as directed by the Clean Air Act of 1977 and Clean Air Act Amendments of 1990. Specifically, CAA Section 110(a)(2)(B)(i) directs the State to, “provide for establishment and operation of appropriate devices, methods, systems, and procedures necessary to...(i) monitor, compile, and analyze data on ambient air quality...”

There are 35 local air pollution control districts in the state of California (Table 1). Three of these local air districts, Bay Area AQMD, South Coast AQMD, and San Diego County APCD are Primary Quality Assurance Organizations (PQAO). Twenty-one of the remaining air districts plus CARB collect ambient air monitoring data and comprise the CARB PQAO.

A PQAO is a monitoring organization or a coordinated aggregation of such organizations that is responsible for a set of stations that monitors the same pollutant and for which data quality assessments can logically be pooled (i.e., that have similar quality systems in place). Specifically, 40 CFR Part 50 Appendix A Section 2 requires that each ambient air monitoring PQAO conform to certain quality management practices. These include:

- Having a documented quality system that meets EPA requirements for QMPs and QAPPs.
- Having a quality management function that is independent of air monitoring operations.
- Developing or adopting DQOs, or equivalent systematic planning procedures, for all monitoring programs.
- Participating in National Performance Evaluation Programs, which consist of performance audits used to independently determine program adequacy, national monitoring network performance, and national consistency.
- Undergoing Technical Systems Audits by EPA at a frequency of every three years or less as needed.
- Using certified reference materials to standardize monitoring equipment.

EPA views these quality management system components as indispensable to maintenance of a credible monitoring program. Insufficient quality management and control has been cited as rationale to support legal challenges to NAAQS designation decisions.

CARB oversees the quality assurance of data collected by local districts within the CARB PQAO. Although both CARB and local air pollution control districts operate ambient monitoring stations throughout the state, responsibility for ambient air monitoring, ultimately rests with CARB. Further, it is the responsibility of CARB to provide QA oversight to ensure that data quality within the CARB PQAO meets CFR requirements and conforms to quality standards approved in the QAPP.

Table 1. List of Air Pollution Control Districts in California

Air Pollution Control District	Ambient Air Monitoring by District?	PQAO
Amador County APCD	N	CARB
Antelope Valley AQMD	Y	CARB

Comment [A8]: Consistency Issue. This is correct number

Comment [A9]: Incorrect citation

Comment [A10]: (Note: for some districts listed below as conducting ambient monitoring, it is a combination of ARB and District operated sites. This may need to be clarified in a footnote or the title of the table))

Bay Area AQMD	Y	Bay Area AQMD
Butte County AQMD	Y (N, all ARB sites)	CARB
Calaveras County APCD	N	CARB
Colusa County APCD	N	CARB
El Dorado County AQMD	N	CARB
Feather River AQMD	N	CARB
Glenn County APCD	N	CARB
Great Basin Unified APCD	Y	CARB
Imperial County APCD	Y	CARB
Eastern Kern County APCD	Y	CARB
Lake County AQMD	Y	CARB
Lassen County APCD	N	CARB
Mariposa County AQMD	N	CARB
Mendocino County AQMD	Y	CARB
Modoc County APCD	N	CARB
Mojave Desert AQMD	Y	CARB
Monterey Bay Unified APCD	Y	CARB
North Coast Unified AQMD	Y	CARB
Northern Sierra AQMD	Y	CARB
Northern Sonoma County APCD	Y	CARB
Placer County APCD	Y	CARB
Sacramento Metro AQMD	Y	CARB
San Diego County APCD	Y	San Diego County APCD
San Joaquin Valley APCD	Y	CARB
San Luis Obispo County APCD	Y	CARB
Santa Barbara County APCD	Y	CARB
Shasta County AQMD	NY	CARB
Siskiyou County APCD	Y	CARB
South Coast AQMD	Y	South Coast AQMD
Tehama County APCD	Y	CARB
Tuolumne County APCD	N	CARB
Ventura County APCD	Y	CARB
Yolo-Solano AQMD	Y	CARB

The ambient air monitoring program in the State of California encompasses many air quality assessment activities, including: collecting and analyzing data for Federal criteria pollutants and many other air pollutants of concern; collecting data from special studies as directed by the Board; determining which monitoring methods are to be used by the State and local air districts, in compliance with Federal and State regulations; conducting annual performance audits of all monitoring equipment within the PQAO; implementing a calibration and certification of measurement standards program; and conducting training in the operation of ambient air monitoring instruments.

Comment [A11]: Delete "Federal and" (ARB designates methods for state purposes only)

Organization of CARB's Ambient Air Monitoring Program

Responsibility for overseeing the ambient air monitoring program for CARB resides within the following branches:

Branch	Division
Air Quality Surveillance Branch (AQSBS)	Monitoring and Laboratory Division (MLD)
Northern Laboratory Branch (NLB)	Monitoring and Laboratory Division (MLD)
Quality Management Branch (QMB)	Monitoring and Laboratory Division (MLD)
Air Quality Data Branch (AQDB)	Planning and Technical Services Support (PTSD)

QA responsibility for CARB is covered primarily by the Quality Management Branch (QMB). Michael Miguel is the QMB Branch Chief. The QMB oversees the development of quality management documents with contributions from other branches, conducts on-site audits, reviews precision and accuracy data, and initiates corrective action requests (i.e., AQDAs), among other duties. The Air Quality Surveillance Branch (AQSBS) and Air Quality Data Branch (AQDB) contribute to QA activities primarily through data validation activities. QC responsibility is handled primarily by the AQSBS, which includes field operations, calibrations, and repair precision/accuracy review/submittal, instrument acceptance testing, determination of CARB Federal/State ambient monitoring methods, development of SOPs, interpretation of CFRs pertaining to monitoring criteria/methods and a variety of other monitoring functions.

The management of QA/QC for local districts within the CARB PQAO is specific to each local district. The CARB PQAO does have common QA oversight for instrument audits, since CARB conducts audits of all sites within California, but other aspects of QA/QC are specific to the relationship that CARB has with each local district. In most cases the local district is responsible for QC aspects of the air monitoring program (e.g., zero/precision/span checks, calibration, and regular on-site review and maintenance). CARB repairs/replaces instruments for some districts while others do this locally. Except for instrument audits, the approach to QA is variable. Many local districts have their own quality management documents; others reference the CARB quality management documents. CARB validates the data that it generates (i.e., data from their own sites and any filters they weigh), but expects that data generated by local districts is validated by the local district, even in the cases where CARB enters the data into AQS. For data certification, CARB certifies its data (i.e., continuous data collected by CARB, which is limited to CARB sites, and filters weighed by CARB, which includes CARB and non-CARB sites) and also data for air districts for which it enters data into AQS. CARB expects that all other data be certified by the local district.

Network Management

Responsibility for network management lies in the Air Quality Data Branch (AQDB). Karen Magliano is the AQDB Branch Chief. Network management responsibilities include network assessment and network plan preparation, analyses and decision-making for CARB system modifications, and review of requests by local agencies within the CARB PQAO for system modifications. Network management for non-CARB sites has traditionally been managed by the local agency.

The state network consists of monitoring stations operated by CARB and the local districts. CARB organizes the networks by air basin, which number fifteen in California. The four PQAOs in the State of California – CARB, South Coast AQMD, Bay Area AQMD, and San Diego APCD – operate monitoring networks that provide data in all the air basins. The three local district PQAOs operate their own monitoring networks that provide data for three of the 15 State air basins: South Coast, Bay Area, and San Diego County. The CARB PQAQO operates multiple monitoring networks that cover the remaining 12 state air basins: Great Basin, Lake County, Lake Tahoe, Mojave Desert, Mountain Counties, North Central Coast, North Coast, Northeast Plateau, Sacramento Valley, Salton Sea, San Joaquin Valley, and South Central Coast. In some instances, multiple local Districts operate the monitoring networks in a given air basin. Furthermore, the boundaries of metropolitan and micropolitan statistical areas (MSAs), which are established by the US Census bureau, also overlap air basins and local monitoring districts. EPA uses the population statistics of MSAs to determine the minimum SLAMS monitoring requirements for criteria pollutants.

Comment [A12]: (should this be district here?),

Comment [A13]: (note the South Coast AQMD includes Coachella Valley, which is a portion of the Salton Sea Air Basin –so it is 3 air basins and a portion of a 4th air basin)

Table 1 summarizes the number of criteria pollutant monitoring sites operated in the ARB PQAQO.

SUMMARY OF SLAMS/Non-SLAMs CRITERIA POLLUTANT MONITORS IN THE CARB PQAQO OPERATING IN 2011

(mIn 0522 12 PM2.5 and PM10 NOT Updated)

Formatted Table

<u>OPERATING AGENCY</u>	<u>Ozone</u>	<u>CO</u>	<u>NO₂</u>	<u>SO₂</u>	<u>PM_{2.5}</u>	<u>PM₁₀</u>	<u>TSP Lead*</u>
<u>CARB</u>	<u>34</u>	<u>7</u>	<u>14</u>	<u>2</u>	<u>17</u>	<u>22</u>	<u>1*</u>
<u>Antelope Valley</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>13/2</u>	<u>0</u>
<u>Great Basin Unified APCD</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>11</u>	<u>0</u>
<u>Imperial County APCD</u>	<u>3</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>2</u>	<u>5</u>	<u>0</u>
<u>Kern County APCD</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>0</u>
<u>Lake County AQMD</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>3</u>	<u>0</u>
<u>Mendocino County APCD</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>3</u>	<u>3</u>	<u>0</u>
<u>Mojave Desert AQMD</u>	<u>5</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>4/1</u>	<u>0</u>
<u>Monterey Bay Unified APCD</u>	<u>5</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>3</u>	<u>4</u>	<u>0</u>
<u>North Coast Unified AQMD</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2</u>	<u>2/1</u>	<u>3/1</u>	<u>0</u>
<u>Northern Sierra AQMD</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>4</u>	<u>3</u>	<u>0</u>
<u>Northern Sonoma County APCD</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>3</u>	<u>0</u>

<u>Placer County APCD</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
<u>Sacramento Metropolitan AQMD</u>	<u>6</u>	<u>4</u>	<u>5</u>	<u>1</u>	<u>4</u>	<u>5</u>	<u>1*</u>
<u>San Joaquin Valley APCD</u>	<u>13</u>	<u>4</u>	<u>9</u>	<u>0</u>	<u>6/7</u>	<u>8</u>	<u>0</u>
<u>San Luis Obispo County APCD</u>	<u>5</u>	<u>0</u>	<u>3</u>	<u>1</u>	<u>1</u>	<u>3</u>	<u>0</u>
<u>Santa Barbara County APCD</u>	<u>10</u>	<u>4</u>	<u>9</u>	<u>6</u>	<u>3</u>	<u>2</u>	<u>0</u>
<u>Shasta County AQMD</u>	<u>3</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1/1</u>	<u>2</u>	<u>0</u>
<u>Siskiyou County APCD</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>3</u>	<u>0</u>
<u>Tehama County APCD</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>
<u>Ventura County APCD</u>	<u>5</u>	<u>0</u>	<u>2</u>	<u>0</u>	<u>4/1</u>	<u>3</u>	<u>0</u>
<u>Yolo-Solano AQMD</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>2</u>	<u>0</u>
TOTALS	102	26	51	14	57/10	104/4	2

NOTE: PM2.5 and PM10 monitor counts were NOT verified or updated.

* TSP lead data should be available at NCore sites; Fresno-Garland committed in the i-SIP to have a lead-TSP sampler operating by January 1, 2012, but no data in ADAM as of May 21, 2012. Same commitment for a lead-PM10 sampler at Sacramento-Del Paso Manor, but no data available in ADAM as of May 21, 2012.

TABLE 2: SUMMARY OF SLAMS/non-SLAMs² CRITERIA POLLUTANT MONITORS IN THE CARB PQAO

OPERATING AGENCY	Ozone	CO	NO₂	SO₂	PM_{2.5}	PM₁₀	TSP Lead
CARB	36 ³	6	12 ⁴	2	17	22	1
Antelope Valley	1	1	1	0	1	13/2	0
Great Basin Unified APCD	0	1	0	1	1	11	0
Imperial County APCD	3	1	1	0	2	5	0
Kern County APCD	0	0	0	0	1	1	0
Lake County AQMD	1	0	0	0	1	3	0
Mendocino County APCD	2	2	2	0	3	3	0
Mojave Desert AQMD	5	2	3	2	1	4/1	0
Monterey Bay Unified	6	1	1	0	3	4	0

² Non-SLAMs includes any regulatory monitors that are not SLAMS (e.g., SPM or other)

³ Includes Arvin—Di Giorgio (060295002) and Shafter (060296001).

⁴ Includes Shafter (060296001)

APCD							
North Coast Unified AQMD	0/1	0/1	0/1	0/1	2/1	3/1	0
Northern Sierra AQMD	2	0	0	0	4	3	0
Northern Sonoma County APCD	1	0	0	0	0	3	0
Placer County APCD	2	0	0	0	0	0	0
Sacramento Metropolitan AQMD	4/2	2/1	4/1	1	4	5	0
San Joaquin Valley APCD	12/1	4	9	0	6/7	8	0
San Luis Obispo County APCD	4	0	2	0	1	3	0
Santa Barbara County APCD	4	2	3	2	3	2	0
Shasta County AQMD	2	0	0	0	1/1	2	0
Siskiyou County APCD	1	0	0	0	1	3	0
Tehama County APCD	1	0	0	0	0	1	0
Ventura County APCD	5	0	2	0	4/1	3	0
Yolo-Solano AQMD	2	0	0	0	1	2	0
TOTALS	94/4	22/2	40/2	8/1	57/10	104/4	1

-Source: California State and Local Air Monitoring Network Plan - 2007, PTSD/AQDB, June 2007

EPA reviewed the monitoring network within the CARB PQAO and found that the number of sites meets minimum monitoring requirements per 40 CFR 58, Appendix D.

In 2006 EPA added a requirement for Annual Monitoring Network Plans and Five-year Network Assessments (40 CFR 58.10). At the time when the first network plan was due (July, 2007), numerous local agencies within the CARB PQAO expressed an interest in submitting their own plan. On this basis, an agreement was reached where agencies within the CARB PQAO that wanted to submit their own plan could follow the process and submit a network plan directly to EPA. CARB submitted a network plan to cover those agencies that did not choose to submit a plan (Table 3). The five-year network assessment that was due in 2010 followed a similar process.

Table 3. List of Agencies Drafting Annual Network Plans in California.

Comment [A14]: (for clarity, specify that the agreement was between Region 9, ARB, and Districts)

Comment [A15]: (The Mojave Desert AQMD and Antelope Valley APCD are included in the ARB report in 2012—Table 3 needs to be updated.)

Agencies Drafting Annual Network Plans

Air districts drafting their own Annual Network Plans	Air districts that are included in this ARB report
Antelope Valley APCD* Great Basin Unified APCD Imperial County APCD Mojave Desert AQMD Monterey Bay Unified APCD North Coast Unified AQMD Sacramento Metropolitan AQMD San Diego County APCD San Francisco Bay Area AQMD San Joaquin Valley Unified APCD San Luis Obispo County APCD Santa Barbara County APCD South Coast AQMD Ventura County APCD	Amador County APCD Butte County AQMD Calaveras County APCD Colusa County APCD Eastern Kern APCD El Dorado County AQMD Feather River AQMD Glenn County APCD Lake County AQMD Lassen County APCD Mariposa County APCD Mendocino County AQMD Modoc County APCD Northern Sierra AQMD Northern Sonoma County APCD Placer County APCD Shasta County AQMD Siskiyou County APCD Tehama County APCD Tuolumne County APCD Yolo-Solano AQMD

* The Mojave Desert AQMD drafted the network plan for the Antelope Valley APCD.

Notes:

APCD stands for Air Pollution Control District

AQMD stands for Air Quality Management District

Source: CARB 2011 Annual Monitoring Network Plan for Small Districts.

As requirements for developing an adequate network are not based on agency jurisdiction, but rather CBSAs or PQAOS, determining whether they have been met calls for a collaborative approach. Furthermore, the network plan per 40 CFR 58.13 must include recommendations from the network assessment. CARB and EPA will need to work together to evaluate whether the requirements for an adequate network have been met.

Requests for changes to the network can occur outside the network plan process by submitting a letter to EPA. In recent years, CARB and EPA have first discussed proposed site changes via conference calls. Once a decision has been made, CARB sends a formal request to EPA for approval. When a local district wishes to modify its network, e.g. shutting down or relocating an existing site or establishing a new site, it will often informally consult with CARB then submit a request to EPA, but the process for local districts has been generally less consistent.

Comment [A16]: (Note: Unable to find this specific requirement in 40 CFR 58.13; it appears that correct reference is 58.14). It is not clear if the report is saying that this requirement to address recommendations from the network assessment has not been met or has been met in part.

Comment [A17]: CONTRADICTS STATEMENT IN PREVIOUS PARAGRAPH "EPA reviewed the monitoring network within the CARB PQAO and found that the number of sites meets minimum monitoring requirements per 40 CFR 58, Appendix D.

Field Operations

Network operations at CARB are primarily performed by the Air Quality Surveillance Branch (AQS) of MLD. Ken Stroud is the Branch Chief of AQS. AQS duties include the operation of CARB monitoring sites, monitoring support for CARB special studies, and general air monitoring support, which includes repair and calibration facilities. AQS also assists local districts with instrument trouble-shooting and repair as resources allow. This section of the TSA report addresses AQS's general operations, the calibration program, and field operations of the AQS at CARB-operated criteria pollutant monitoring sites.

Providing training and performing instrument certifications are the responsibilities of the Operations Support Section (OSS) within AQS. The OSS also provides independent review and approval of field SOPs. Other responsibilities include instrument repair and technical support. While support (e.g., training, field procedures, and other technical support) is available to the all local districts in California, the AQS does not to actively manage the local districts' field monitoring quality systems nor does it have the resources to do so.

Laboratory Operations

Analytical laboratories provide support for measurement methods that are either too complex or sensitive to perform in the field environment. In order to provide these services, laboratories have highly trained, specialized staff to run the sophisticated instrumentation. In order for analyses to be used as information or evidence, they must meet the following criteria:

1. Equipment must be frequently and properly calibrated and maintained.
2. Personnel must be qualified to make the analysis.
3. Analytical procedures must be in accordance with accepted practice.
4. Complete and accurate records must be kept.

The CARB MLD Northern Laboratory Branch (NLB)⁵ is divided into three sections: the Inorganic Laboratory Section, Organic Laboratory Section, and the Special Analysis Section. Cindy Castronovo is the Branch Chief of NLB. The laboratory facility is adequate for the NLB's needs. The laboratory provides analytical support for the criteria pollutants PM₁₀ and PM_{2.5}. Additionally, the laboratory supports the EPA PM Speciation Trends Network (STN), the California Air Toxics Monitoring Network, and Special Study Monitoring. CARB's NLB laboratory facility is located in Sacramento, California. Analyses are performed in-house by laboratory staff.

Particulate Matter Laboratory (Gravimetric Laboratory)

The gravimetric laboratory operations are managed by Michael Werst, Inorganic Laboratory Section Manager. The gravimetric laboratory is housed in Sacramento, California. Analyses are performed in-house by laboratory staff. The particulate matter laboratory is responsible for the handling of PM filters, which includes preparation, weighing, tracking, and storing PM_{2.5} and PM₁₀ filters.

Toxics Laboratory

⁵ CARB also has a Southern Laboratory Branch but this laboratory does not handle ambient air monitoring sample and analyses but rather source testing and other non-ambient samples.

In addition to PM responsibilities, the laboratory is also responsible for air toxics monitoring analysis. This TSA focused on the following compounds:

- Carbonyls (Method MLD022 MEK, acetaldehyde) (Method TO-11 acetone, acetaldehyde, and formaldehyde)
- Hexavalent chromium
- Aromatic and halogenated compounds
- Oxygenated hydrocarbons and nitriles
- Trace Elemental Analysis by ICP-MS (toxic metals program)

Comment [A18]: Change “Carbonyls Method TO-11 acetone, acetaldehyde.....” to Carbonyls Method MLD022 MEK, acetaldehyde.....

Comment [A19]: Toxics Laboratory: include in the list of analyzed compounds: trace elemental analysis by ICP-MS (toxic metals program).

There are a number of additional activities that the laboratory undertakes to support the collection and analysis of air pollutants. These include canister cleaning and preparation, data validation, and sample storage.

Data Management

Data management generally involves data collection, data validation supported by a data management system. A primary goal of the EPA’s Quality System is “to ensure that environmental programs and decisions are supported by data of the type and quality needed for their intended use...” (*EPA Quality Manual for Environmental Programs*, EPA Order 5360A1 (EPA, 2000a)). Achievement of this goal involves planning, implementation and assessment of the data collection process. Data verification and data validation are key steps in the assessment of environmental measurements. EPA defines data verification as the process of evaluating completeness, correctness and compliance of a data set against the method requirements. Data validation extends the verification process to determine the analytical quality of a data set. As a part of this TSA, EPA evaluated CARB’s process of data handling, verification, validation, storage and upload to AQS of ambient monitoring measurements.

On-going data collected from ambient air monitoring stations can either be generated by an analyzer in-situ (i.e., “continuous” data) or by subsequent laboratory analyses of a sample (i.e., “lab” data). Data management differs depending on whether the data are continuous or laboratory data. Within the CARB PQAO, the different agencies collect and generate air quality data. In addition to the on-going collection of air quality data, periodic QC checks generate data that must also be managed. The following table indicates which types of data are uploaded by which agency:

Table 4. Summary of data upload and certification responsibilities for the State of California.

<u>Agency Operating Site</u>	<u>Agency Uploading Continuous Data</u>	<u>Certified By?</u>	<u>Agency Uploading PM Filter-based Laboratory Data</u>	<u>Certified By?</u>
<u>Antelope Valley APCD</u>	<u>Mojave Desert AQMD</u>	<u>Not certified*</u>	<u>Mojave Desert AQMD</u>	<u>N/A</u>
<u>CARB</u>	<u>CARB (MLD-AQSB# Monitoring</u>	<u>CARB (AQAS)</u>	<u>CARB (NLB) / Ventura County- PM_{2.5} (2 CARB</u>	<u>CARB (AQAS)/ not certified</u>

	<u>North Section</u>		<u>sites)</u>	
<u>Great Basin Unified APCD</u>	<u>Great Basin Unified APCD</u>	<u>Great Basin Unified APCD</u>	<u>Great Basin Unified APCD</u>	<u>Great Basin Unified APCD</u>
<u>Imperial County APCD</u>	<u>CARB (AQAS)</u>	<u>CARB (AQAS)</u>	<u>CARB (NLB) – PM₁₀/ San Diego County APCD – PM_{2.5}</u>	<u>CARB (AQAS)/PM2.5- not certified</u>
<u>Lake County AQMD</u>	<u>CARB (AQAS)</u>	<u>CARB(AQAS)</u>	<u>CARB (AQAS)- PM₁₀⁺/ (Bay Area)- PM_{2.5}</u>	<u>CARB (AQAS)/ PM2.5-not certified</u>
<u>Mendocino County AQMD</u>	<u>CARB (AQAS)</u>	<u>CARB (AQAS)</u>	<u>N/A</u>	<u>N/A</u>
<u>Mojave Desert APCD</u>	<u>Mojave Desert APCD</u>	<u>Not certified*</u>	<u>Mojave Desert APCD</u>	<u>Not certified</u>
<u>North Coast Unified AQMD</u>	<u>CARB (AQAS)</u>	<u>CARB (AQAS)</u>	<u>CARB (AQAS)- PM₁₀⁺/ (Bay Area)- PM_{2.5}</u>	<u>CARB(AQAS)/ PM2.5-not certified</u>
<u>Northern Sierra AQMD</u>	<u>Northern Sierra AQMD</u>	<u>Not certified</u>	<u>CARB (NLB)</u>	<u>CARB (AQAS)</u>
<u>Monterey Bay Unified APCD</u>	<u>Monterey Bay Unified APCD</u>	<u>Monterey Bay Unified APCD</u>	<u>Bay Area AQMD</u>	<u>Not certified</u>
<u>Northern Sonoma County APCD</u>	<u>CARB (AQAS)</u>	<u>CARB (AQAS)</u>	<u>CARB (AQAS)- PM₁₀</u>	<u>CARB (AQAS)</u>
<u>Placer County APCD</u>	<u>CARB (AQAS)</u>	<u>CARB(AQAS)</u>	<u>N/A</u>	<u>N/A</u>
<u>Sacramento Metro APCD</u>	<u>CARB (AQAS)</u>	<u>CARB (AQAS)</u>	<u>CARB (NLB) – PM_{2.5} and PM₁₀ coarse / CARB (AQAS) – PM₁₀[±]</u>	<u>CARB (AQAS) PM_{2.5}, PM₁₀ coarse and PM₁₀[±]</u>
<u>San Joaquin Valley APCD</u>	<u>San Joaquin Valley APCD</u>	<u>San Joaquin Valley APCD</u>	<u>Ventura</u>	<u>Not certified</u>
<u>San Luis Obispo County APCD</u>	<u>San Luis Obispo County APCD</u>	<u>San Luis Obispo County APCD</u>	<u>N/A</u>	<u>N/A</u>
<u>Santa Barbara County APCD</u>	<u>Santa Barbara County APCD</u>	<u>Santa Barbara County APCD</u>	<u>Santa Barbara County APCD^x</u>	<u>Santa Barbara County APCD</u>
<u>Shasta County AQMD</u>	<u>Shasta County AQMD</u>	<u>Shasta County AQMD</u>	<u>CARB (NLB)</u>	<u>CARB (AQAS)</u>
<u>Siskiyou County APCD</u>	<u>CARB (AQAS)</u>	<u>CARB (AQAS)</u>	<u>CARB (NLB)</u>	<u>CARB (AQAS)</u>
<u>Tehama County APCD</u>	<u>CARB (AQAS)</u>	<u>CARB (AQAS)</u>	<u>CARB (NLB)</u>	<u>CARB (AQAS)</u>

<u>Ventura County APCD</u>	<u>Ventura County APCD</u>	<u>Ventura County APCD</u>	<u>Ventura County APCD</u>	<u>Ventura County APCD</u>
<u>Yolo-Solano AQMD</u>	<u>CARB (AQAS)</u>	<u>CARB (AQAS)</u>	<u>CARB (NLB)</u>	<u>CARB (AQAS)</u>

Agency Operating Site	Agency Uploading Continuous Data	Certified By?	Agency Uploading PM Filter-based Laboratory Data	Certified By?
Antelope Valley APCD	Antelope Valley APCD	Not certified*	N/A	N/A
CARB	CARB (AQAS)	CARB (AQAS)	CARB (NLB)/ Ventura County	CARB (NLB)/ Not certified
Great Basin Unified APCD	Great Basin Unified APCD	Great Basin Unified APCD	Great Basin Unified APCD	Great Basin Unified APCD
Imperial County APCD	CARB (AQAS)	CARB (AQAS)	CARB (NLB) — PM₁₀/ San Diego County APCD — PM_{2.5}	CARB/not certified
Lake County AQMD	CARB (AQAS)	CARB (AQAS)	CARB (AQAS) ⁺	CARB (AQAS)
Mendocino County AQMD	CARB (AQAS)	CARB (AQAS)	N/A	N/A
Mojave Desert APCD	Mojave Desert APCD	Not certified*	Mojave Desert APCD	Not certified
North Coast Unified AQMD	CARB (AQAS)	CARB (AQAS)	Bay Area AQMD	Not certified
Northern Sierra AQMD	Northern Sierra AQMD	Not certified	CARB (NLB)	CARB (NLB)
Monterey Bay Unified APCD	Monterey Bay Unified APCD	Monterey Bay Unified APCD	Bay Area AQMD	Not certified
Northern Sonoma County APCD	CARB (AQAS)	CARB (AQAS)	N/A	N/A
Placer County APCD	CARB (AQAS)	CARB (AQAS)	CARB (AQAS) ⁺	CARB (AQAS)
Sacramento Metro APCD	CARB (AQAS)	CARB (AQAS)	CARB (NLB) — PM_{2.5} and PM₁₀ coarse/ CARB (AQAS) — PM₁₀⁺	CARB (NLB) — PM_{2.5} and PM₁₀ coarse/ CARB (AQAS) — PM₁₀⁺
San Joaquin Valley APCD	San Joaquin Valley APCD	San Joaquin Valley APCD	Ventura	Not certified
San Luis Obispo	San Luis Obispo	San Luis Obispo	N/A	N/A

Comment [A20]: Should also include San Diego APCD. Their lab supports ARB's Calnexico-PM2.5 FRM

County APCD	County APCD	County APCD		
Santa Barbara County APCD	Santa Barbara County APCD	Santa Barbara County APCD	Santa Barbara County APCD*	Santa Barbara County APCD
Shasta County AQMD	Shasta County AQMD	Shasta County AQMD	CARB (NLB)	CARB (NLB)
Siskiyou County APCD	CARB (AQAS)	CARB (AQAS)	CARB (NLB)	CARB (NLB)
Tehama County APCD	CARB (AQAS)	CARB (AQAS)	N/A	N/A
Ventura County APCD	Ventura County APCD	Ventura County APCD	Ventura County APCD	Ventura County APCD
Yolo Solano AQMD	CARB (AQAS)	CARB (AQAS)	CARB (NLB)	CARB (NLB)

* Ozone data for 2009-2011 was certified by the local district in 2011 only.

+ These data are weighed by local district but uploaded by CARB (AQAS)

* Applies only to filter-based PM₁₀ measurements but these will be changing to continuous sampling during summer 2012.

California has five organizational units in two different Divisions of CARB, and 26 separate Air Pollution Control Districts through which ambient monitoring data enters EPA's AQS database. Responsibility for managing the state's CAA-required ambient monitoring data is divided between the following groups:

1. Continuous data from CARB-operated field monitoring stations – MLD/AQSB, Ken Stroud, AQSB Chief
2. CARB laboratory analytical data for both CARB and non-CARB Sites – MLD/NLB, Cindy Castronovo, NLB Chief
3. Quality assurance performance audit program data – MLD/QAS, Merrin Wright, QAS Manager
4. Special purpose monitoring projects and Standards Laboratory– QMB/OPAS, Jeff Wright, OPAS Manager; and MLD/Special Purpose Monitoring Section (SPMS), Erie Mac McDougall, SPMS Manager
5. Local district site data: operated by local district but AQS-uploaded by CARB – PTSD/AQDS/AQAS, Gayle Sweigert, AQDS-AQAS Manager
6. Local district site data: operated and AQS-uploaded by local district – various local air pollution control agencies
7. Local District Site Data: Operated by Local District with Laboratory Analyses by a Different Laboratory that is not CARB – responsibility is variable and unclear.

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1. Data Management: Continuous Data from CARB-operated Field Monitoring Stations Data

Continuous data from CARB-operated field monitoring stations includes data from all continuous air quality analyzers (i.e., O₃, NO₂, CO, SO₂, and non-filter based PM) and meteorology data. The CARB-operated ambient monitoring stations are managed by Ken Stroud, AQSB Chief. There are two regional Supervisors, Joe Guerrero (AMNS), and Fernando Amador (Air Monitoring Southern Section (AMSS)). Air quality data measured by the continuous analyzers at the field stations operated and maintained by CARB are stored in data loggers and

station computers. Each station is polled hourly by modem and the data are transmitted directly to CARB's central computer system in Sacramento. The computer system consists of a server located within a leased facility and a second backup server located in a separate leased facility. The data are collected in the Air Quality Data Acquisition System (AQDAS), which was developed by EMC, Inc. The AQDAS (now AQDAS-II) is CARB's primary data management tool for data collection, validation, and reporting for data obtained at CARB-operated stations. Data are retained in AQDAS-II for 180 days within which time they have been uploaded to AQS. Once submitted to AQS, the data are downloaded to the CARB database Air Data Management System (ADAM). ADAM is CARB's official state database for ambient air quality data. Chart recorders and data loggers located at each station provide a supplemental record for the data validation process; the printouts are stored for four years as primary data records.

At the time of the audit, the SOP for data validation had not been finalized but the Air Pollution Specialist who conducts the second-level review provided some overview sheets that describe the data review process (see Appendix C). The first review (first-level validation) of the data is performed by the CARB station operators. Each field operator has password-protected access to data from his/her own field sites. If data require correction, the station operator makes a notation on the data logger or chart recorder at the station and edits the data set. In some cases, the need for data correction may originate from the QAS in the form of an Air Quality Data Action (AQDA). In these cases the field operator then reviews the data and determines and justifies the appropriate action.

Comment [A21]: Data Validation SOP was finalized but was in the process of being updated.

The second-level review is done by an Air Pollution Specialist and/or an Air resources Engineer; this includes a review of data flags, completeness, QC charts, audit results, monthly max/mins, and maintenance check sheets. The overview sheets for the second-level review (Appendix C) indicate that the second-level review should include data comparisons, such as tracking of pollutants, $\text{NO}_2 + \text{NO} \leq \text{NO}_x$, $\text{PM}_{2.5} < \text{PM}_{10}$, etc. However, we did not observe a formal process in place to make such comparisons (e.g., charts, figures, calculations). Instead, the second-level reviewer scans printouts of data and spot checks strip charts. Any data corrections identified in the first-level review are reviewed and confirmed by the Air Pollution Specialist. The Air Pollution Specialist does not verify the correctness of the data but rather looks for required checks (e.g., audits) and outliers. The data stream then proceeds to the next level of review (third-level validation) by the appropriate Section Supervisor who reviews data for completeness and considers any significant issues that have been identified by previous-level review.

Comment [A22]: Where did this document come from? Section should reference QA Manual vol 11 section 2.0.4.

Comment [A23]: The Air Pollution Specialist verifies the correctness of the data by looking at daily quality control checks, daily zero checks, diurnal patterns, monthly maintenance checks, and identifying outliers.

Comment [A24]: Incorrect – 1st level performed by station operator, 2nd level by APS/ARE, 3rd level by Manager, 4th level by Branch Chief, 5th level by Norma.

At this point, a final data validation summary report - the monthly data report - is produced in the form of a memo to the AQS Branch Chief identifying any significant issues for each site and reporting on completeness for all parameters. Upon approval by the AQS Branch Chief, the data are stored in the State archive system and submitted to the EPA AQS database. AQS submittal is done by the data validator, Norma Montez, through a password-protected system on her computer.

Overall, CARB submits all required data to the EPA AQS database, including concentrations for all criteria pollutants, and supporting precision and accuracy information. CARB certifies these data annually as required by regulation (40 CFR 58.15).

2. Data Management: CARB Laboratory Analytical Methods for both CARB and Non-CARB Sites

Overview:

Data flow in the laboratory begins with the chemist who runs the analytical method and generates the data (gravimetric or chemical analysis). Once collected, all laboratory data are stored in the CARB's Laboratory Information Management System (LIMS). The original LIMS was a product purchased from Perkin-Elmer, but the system has had many modifications to customize it for use by CARB over the years. The LIMS database is housed in the Monitoring and Laboratory Division and is backed up once per week to tape. It is accessible to all chemists and managers. The system makes use of limited access and password-protection for security. The raw data in the system is stored for five years. LIMS assigns QC flags as defined by CARB SOPs. All data are subjected to peer review for level-two data validation, which is followed by reviewing and 'locking' of the data by laboratory managers. Data peer-review groups are organized around the analytical methods: PM₁₀, PM_{2.5}, PM_{2.5} speciation, and TSP-lead. The QC criteria as written in the laboratory and analytical methods are used for data validation.

Gravimetric (PM) Laboratory:

PM₁₀ and PM_{2.5} filters arrive at the NLB with a Chain of Custody (CoC) form. The gravimetric laboratory handles filters from both CARB and local districts: CARB does not treat filters from CARB or local-district sites differently. Samples are linked with a barcode, which is read with a barcode reader. Mass data, that are linked to its barcode, are entered automatically from the balance. The chemist enters field information from the CoC form manually, which does not include the mass data. Flags can be identified by anyone in the CoC. The PM data management process includes many useful features including:

- Automatic checks on parameters such as flow and pressure – values outside the ranges specified in the system are highlighted
- Hold times for filters are tracked and priority of use indicated based on hold times.
- A scheduling report identifies missing samples

The field operators review instrument operation and note any need to flag data on the CoC. The first level of data validation is done by the chemist who weighs the filters. The chemist verifies sample receipts, information on CoC, correct logging of data into LIMS, and QC data. A monthly data package is generated and provided to a peer chemist (i.e., someone not involved in the data generation) for the second-level data validation. After the second-level data validation is done, the monthly data package, along with any notes on the data, is provided to the Inorganic Laboratory Section Manager for third-level review. The NLB Chief approves the data. The cover sheet on the monthly data package includes a summary of the results of each level of review. Once data are approved by management, they are locked and can only be changed with management approval. Data are uploaded to AQS after approval by NLB Chief.

Comment [A25]: Misunderstanding of sample validation process - 1st level data validation is performed by the station operator. AQS then performs 2nd level, and so on, for equipment operation, NLB perform 2nd level, and so on, for sample validation.

All PM data weighed and entered by the CARB laboratory is certified by CARB annually as required by regulation (40 CFR 58.15).

Toxics Laboratory:

The toxics laboratory follows the same general protocols for data entry and validation as the rest of the laboratory, ~~and follows the same level of peer review and management approval as the criteria pollutants~~, but may not always include a ~~peer review for the~~ second-level review.

3. Data Management: CARB Quality Assurance Data

Quality assurance performance data include state-wide annual performance audits conducted by CARB and the intercomparison between CARB and EPA's audit systems. The Quality Assurance Section in the MLD conducts performance evaluation audits and technical system audits at ambient air monitoring stations throughout the state. Performance audits are conducted annually of each local air pollution control districts for gaseous criteria pollutant monitoring and particulate matter monitoring flow audits. The results of the audits are maintained online on the CARB website and are also uploaded by CARB to AQS in most cases. In some instances, CARB has not received update rights to some local district's screening files in AQS; in these cases the local district or EPA uploads the data. EPA conducts an annual intercomparison with the CARB audit vehicles to ensure comparability with EPA's National Performance Audit Program (NPAP) and Performance Evaluation Program (PEP); these data are also uploaded to AQS by CARB.

In addition to collecting and managing data from audits, the Quality Assurance Section also reviews quality assurance data for the entire state. At least once a quarter, QAS staff retrieve AMP 255 reports from AQS for all California sites and all pollutants. QAS staff review the report for inconsistencies and work with each agency to address any issues. QAS also verifies and validates the AMP 255 reports for the data certification process.

4. Data Management: CARB Special Purpose Monitoring

Special Purpose Monitoring is conducted on an as-needed basis by the following two sections within MLD: the Operations Planning and Assessment Section, which is located within the Quality Management Branch, ~~and~~ the Special Purpose Monitoring Section, which is located within the AQSB. They are responsible for emerging air monitoring issues. In most cases, the data are uploaded to AQS. EPA did not interview staff in this section about data management practices and so validation and certification practices are not addressed in this TSA.

5. Data Management: Local-District-collected/ARB-Uploaded-to-AQS

The Air Quality Analysis Section (AQAS), in the Planning and Technical Support Division, is the organization responsible for uploading continuous air quality data (i.e., O₃, NO₂, CO, SO₂, and non-filter based PM) and meteorology data from those local districts without direct access to AQS. The AQAS is located at the Cal EPA Headquarters building in Sacramento, CA and is managed by Gayle Sweigert. Pheng Lee ~~and Dwight Oda are is~~ the staff ~~person~~ responsible for this duty. Note that ~~while~~ this group uploads continuous PM data from local districts, ~~it does not upload~~ as well as PM filter data for Lake County, North Coast Unified, Northern Sonoma County, and Sacramento Metro air districts. Any PM filter data from local district sites that CARB weighs is managed by the CARB's Northern Laboratory Branch in the MLD.

Data are received electronically by email or as hard copy through the mail from ten different local districts: Imperial County APCD, Lake County AQMD, Mendocino County AQMD, North Coast Unified AQMD, Northern Sonoma County APCD, Placer County APCD, Sacramento Metro APCD, Siskiyou County APCD, Tehama County APCD, and Yolo-Solano AQMD (see Table 4). Local districts typically send their data monthly in the form of an electronic file. When data arrives at AQAS, they are logged in ~~and then- AQAS staff runs them through AQS review protocols. If they pass the AQS protocols, they are~~ uploaded to AQS. ~~Staff sends an email to the district staff confirming the upload, which has attached the AQS raw data report and the raw data inventory report. During submission, if~~ the AQS review protocols identify a potential issue, ~~then~~ AQAS staff ~~contact~~ the district to resolve the potential issue. AQAS staff are not ~~to supposed to materially~~ alter a district's data without consent from the district, ~~based on ARB's data handling SOP~~. AQAS staff do not validate the data. It is assumed by CARB that the data to be uploaded to AQAS for local districts have been fully validated, and carry the appropriate flags.

~~Continuous d~~Data uploaded by AQAS for the ten districts listed above are certified by CARB annually, as required by regulation (40 CFR 58.15).

6. Data Management: Local District-Collected/Uploaded-to-AQS

The following districts have access and authority to upload their data to AQS: Great Basin Unified APCD, Mojave Desert AQMD (includes Antelope Valley APCD), Northern Sierra AQMD, Monterey Bay Unified APCD, Shasta County AQMD, San Joaquin Valley APCD, San Luis Obispo County APCD, Santa Barbara County APCD, and Ventura County APCD (see Table 4). The reporting of data into AQS by these local districts was agreed upon and commemorated by district-specific Memorandums of Understanding signed by the districts, CARB, and EPA starting in 2002. All levels of data management are handled by the local districts: CARB is neither involved nor familiar with data management protocols of districts that submit their own data. For data that CARB does not upload, CARB expects that data to be certified per regulation (40 CFR 58.15) by either the local district collecting the data or by the agency uploading the data.

7. Local District Site Data: Operated by Local District with Laboratory Analyses by a Different Laboratory that is not CARB

All continuous data is managed primarily by each local district; CARB uploads data for ten of the districts (see Table 4). Data generation and management for PM filter-based data is not only district-specific but can even be site-specific. Some districts weigh their own filters and upload and certify their own PM data. Other districts collect the filters and then send them to CARB for weighing, validation, upload, and certification. Other districts collect their filters and send them to a different local district that has a weigh laboratory for weighing; responsibility for data validation, upload, and certification in these cases is not always clearly defined. Finally, some districts may send filters from some sites to CARB and filters from other sites to a different local district that may be convenient to the site. In the case where all filters are sent to a different local district, responsibility for data validation, upload, and certification of the filters that are not weighed by CARB is not always clearly defined. For example, until 2011, filters from a CARB site in the San Joaquin Valley were being sent to and weighed by Ventura County APCD.

Quality Control and Quality Assurance

Quality management describes an organization's quality assurance, quality control, and quality improvement activities. EPA requires that ambient air monitoring agencies have a quality management system that conforms to 40 CFR Part 58 Appendix A and the EPA quality policy (EPA Order CIO 2105.0). Additionally, EPA grant regulations specifically require each grantee to provide for QA activities (40 CFR Part 31.45). Specifically, 40 CFR Part 58 Appendix A Section 2 requires that each ambient air monitoring PQAQO conforms to certain quality management practices. These include:

- Having a documented quality system that meets EPA requirements for QMPs and QAPPs.
- Having a quality management function that is independent of air monitoring operations.
- Developing or adopting DQOs, or equivalent systematic planning procedures, for all monitoring programs.
- Participating in National Performance Evaluation Programs, which consist of performance audits used to independently determine program adequacy, national monitoring network performance, and national consistency.
- Submitting to Technical Systems Audits by EPA at a frequency of every three years or less.
- Using certified reference materials to standardize monitoring equipment.

EPA views these quality management system components as integral to maintaining a credible monitoring program. Insufficient quality management and control has been cited in support of legal challenges to NAAQS designation decisions.

Quality control and quality assurance are the two components of quality management within a monitoring program that support the assumption that the data collected represent the true air quality of the area. They are the means by which an organization manages its quality aspects in a systematic, organized manner and provides a framework for planning, implementing, and assessing work performed by an organization. A properly developed QA/QC program encompasses a variety of technical and administrative elements, including policies and objectives, organizational authority, responsibilities, accountability, and procedures and practices. Quality assurance is a management or oversight function setting policy and running an administrative system of management controls that cover planning, implementation, the review of data collection activities, and the use of data in decision making. Quality control is a technical function that includes all the scientific precautions, such as calibrations and duplications, that are needed to acquire data of known and adequate quality.

The CARB Quality Management Branch (QMB) is composed of two sections: (1) the Quality Assurance Section (QAS), ~~which includes the Standards Laboratory~~, and ~~the~~ (2) Operations Planning and Assessment ~~Section~~ (OPAS) ~~which includes the Standards Laboratory~~. The QAS's primary responsibilities include:

- Conducting performance audits of MLD and district monitoring instruments.
- Assisting with system audits of California air districts.
- Updating standard operating procedures (SOPs) specific to the QAS's activities.
- Validating MLD's field generated monitoring data (accuracy assessments).

- Preparing annual reports on the status of QA activities occurring in MLD.
- Preparing data quality summary reports for Reporting Organizations and districts in California.

• ~~Providing standards certifications for gaseous and flow transfer standards (Standards Laboratory).~~

• ~~Performing standards certifications for all MLD gaseous and flow transfer standards. Some California Districts also choose to employ these services (Standards Laboratory).~~

The OPA section is responsible for ~~board-wide oversight, including review of providing recommendations to~~ MLD laboratory ~~ies to enhance the performance to ensure defensible defensibility of the~~ laboratory data ~~and oversight of and planning for special purpose monitoring.~~ The Standards Laboratory resides in OPA and performs standards certifications for all MLD gaseous, ozone, flow, and meteorological transfer standards. Most districts within the CARB PQAO choose to employ these services as well.

QA-related functions are ~~also~~ performed by the Air Quality Surveillance Branch (AQSB). The AQSB performs several quality management functions. These include:

- Developing and administering the training program for instrument operators.
- Performing instrument ~~certifications.~~
- Validating MLD field generated monitoring data ~~(precision assessments).~~
- ~~Maintaining a system for formal corrective actions.~~
- ~~Developing, P~~reparing and reviewing SOPs for CARB's ~~the~~ air monitoring program.
- ~~Determining monitoring methods used in CARB's ambient air monitoring network.~~

Comment [A26]: Acceptance Testing?

Comment [A27]: calibrations

QA-related functions in the Northern Laboratory Branch include:

- Developing laboratory and ambient air collection test procedures.
- Performing near-source ambient air ~~monitoring.~~
- Conducting analyses of ambient air samples and consumer products.
- Performing self-assessments quarterly and producing a quality control summary report for the Division chief.

Comment [A28]: Belongs as an AQSB bullet above

QA-related functions are integrated throughout CARB's air monitoring operations. As a result, it can be difficult for the QMB to coordinate QA activities. Moreover, the scope and organization of the various QA activities are not fully understood by the QMB. With the exception of AQDA forms that are issued primarily out of the QAS and the Standards Laboratory in OPA, as well as ~~and~~ the technical bulletins from the AQSB, corrective action is limited and would benefit from expansion in scope and documentation. CARB has all the necessary components for an effective and robust QA system. Each Division involved in the collection and reporting of ambient air data understands and performs QA. Expanding the oversight authority of the QMB, and developing and implementing an expanded corrective action process would enhance CARB's QA system.

The QMB staff is not aware of the extent to which QA activities are performed in the districts. The districts in the CARB PQAO are expected to follow the MLD Quality Assurance Plan (QAP).

OVERVIEW OF IMPERIAL COUNTY AIR POLLUTION CONTROL DISTRICT'S AIR MONITORING PROGRAM

As part of the CARB TSA, EPA also reviewed the ambient air monitoring activities of the Imperial County Air Pollution Control District (ICAPCD). ICAPCD is currently part of the ARB PQAO, but this audit included an agency- specific assessment of network design, field operations, data handling, quality assurance and quality control procedures. EPA staff interviewed ICAPCD management and staff and visited all the monitoring sites located in Imperial County: Calexico Ethel, Niland, Brawley, Westmorland, and El Centro monitoring sites.

ICAPCD managers and staff were very accommodating, making themselves available for many interviews, procedural reviews and monitoring site visits. Management and staff interviewed were:

Brad Poiriez – Air Pollution Control Officer
Reyes Romero – Assistant Air Pollution Control Officer
Jesus Rameriz – Air Pollution Control Division Manager
Monica Soucier – Air Pollution Control Division Manager
Michael Green – Air Pollution Control Technician
Jon Barroga – Air Pollution Control Technician
Emmanuel Sanchez – Air Pollution Control Environmental Coordinator

Overall, the monitoring staff is very dedicated, knowledgeable, and operates the monitoring network to the best of their ability. As described in the attached findings, the major deficiency in the monitoring program is the lack of a structured and formalized framework that is inherent to a functioning quality system required for ambient air monitoring. Some of the findings in this TSA pertain to CARB's role as a PQAO and its relationship and oversight responsibilities to local districts. While the PQAO relationship between local districts and CARB has not been formalized, increased communication and coordination between the two districts is needed to effectively maintain the ambient air monitoring network in Imperial County.

Network Management

There are five monitoring sites in Imperial County. Four sites are operated by the Imperial County Air Pollution Control District (Table 2).

ICAPCD submits its own Annual Monitoring Network Plan directly to EPA. If ICAPCD seeks to make changes to its network outside the Annual Monitoring Network Plan process, the district works with CARB to resolve potential issues.

The minimum monitoring requirements as outlined in 40 CFR 58, Appendix D for PM₁₀, PM_{2.5} and O₃ are being met.

Field Operations

Some quality control checks and maintenance are performed in accordance with EPA regulations. Field technicians are responsible for day-to-day operations as well as minor instrument repair, and preliminary data validation. The monitoring stations operated by the district are set up to perform automated nightly internal zero/spans (IZS). One-point precision checks for O₃ are performed manually, but PM₁₀ and PM_{2.5} flow verifications are not performed by ICAPCD operators.

The ICAPCD uses CARB SOPs. Hardcopies of the SOPs are kept at the sites and online via the CARB website. Operators keep track of unusual events or anomalies for continuous instruments in the station log, though records at the sites are generally not sufficiently detailed or organized. Any special events or anomalies for PM₁₀ and PM_{2.5} filters are recorded on the CoC sheet and sent to CARB and San Diego County APCD with the filter, respectively. Although standard logbooks are not used by ICAPCD, alternative documentation methods are utilized, e.g. notes on the station calendar, monthly maintenance sheets, and other informal methods.

Corrective actions and repair/maintenance are dealt with on a case-by-case basis. Generally, minor equipment repairs are performed by ICAPCD, while major repairs are performed by the CARB Southern California office in El Monte.

Laboratory Operations

ICAPCD does not operate an approved PM laboratory but instead relies on CARB for PM₁₀ filter weighing and San Diego County APCD for PM_{2.5} filter weighing. Also, ICAPCD relies on CARB for the following laboratory support: ozone primary standard verification, protocol gas certification, [flow, and meteorological transfer standard calibration](#), instrument calibration, and major instrument repair. Most of the support for ICAPCD comes from the CARB Southern California office located in El Monte.

Data Management

Currently, neither ICAPCD nor CARB are assessing whether the required data quality objectives and measurement quality objectives have been achieved.

Comment [A29]: Data validation should be conducted by Agency reporting data?

ICAPCD station operators perform a preliminary assessment of the gaseous and continuous PM₁₀ raw data, though this process is generally not documented or preformed with a predefined set of SOPs or other procedures outlined in a relevant QAPP. After initial editing is performed, raw text files are sent to CARB for submission to AQS. Neither ICAPCD nor CARB perform further (i.e. Level II) validation of the data.

Filter based PM₁₀ and PM_{2.5} data are processed, validated, and submitted to AQS by CARB Northern Laboratory Branch and San Diego County APCD ~~and CARB~~, respectively and follow procedures outlined in agency specific QAPPs and SOPs.

QA/QC

ICAPCD conducts some QA/QC activities and relies on CARB to support other QA/QC activities. QA/QC activities conducted by ICAPCD include one-point QC checks for gaseous monitors. ICAPCD relies on a CARB site operator to perform the required flow verifications for PM₁₀ and PM_{2.5}. ICAPCD should be conducting these activities, but does not have the equipment required to perform the required checks. CARB also conducts the following QA/QC activities: gaseous annual performance evaluations and semi-annual flow rate audits for PM₁₀ and PM_{2.5}, and flow, meteorological ozone, and gaseous standard verifications and certifications.

ICAPCD is not currently following approved CARB QAPPs, SOPs, or approved surrogates. ICAPCD does not have the following QA functions: QA manager, formal corrective action process, or an independent audit program.

Comment [A30]: Conflicts with 1st sentence in second paragraph under "Field Operations"

OVERVIEW OF MENDOCINO COUNTY AIR POLLUTION CONTROL DISTRICT'S AIR MONITORING PROGRAM

As part of the CARB TSA, EPA also reviewed the ambient air monitoring activities of the Mendocino County Air Quality Management District (MCAQMD). The MCAQMD is currently part of the CARB PQAQ. This audit included an agency-specific assessment of network design, field operations, data handling, quality assurance and quality control procedures. In July 2011, EPA staff interviewed MCAQMD management and staff and visited all four of the monitoring sites located in Mendocino County: the Ukiah AQMD (06-045-0008), Ukiah Library (06-045-0006), Willits (06-045-2002), and Fort Bragg (06-045-0002) monitoring sites.

The MCAQMD manager and staff were very accommodating, making themselves and their staff available for interviews, procedural reviews and monitoring site visits. Management and staff interviewed were:

Chris D. Brown – Air Pollution Control Officer
Bob Scaglione – Senior Air Quality Specialist

Overall, the staff and manager were professional and helpful, and very knowledgeable about the county and potential pollution sources. As described in the attached findings, the major deficiency in the monitoring program is the lack of a structured and formalized framework that is inherent to a functioning quality system required for ambient air monitoring. Some of the findings in this TSA pertain to CARB's role as a PQAQ and their relationship and oversight responsibilities to local districts. While the PQAQ relationship between local districts and CARB has not been formalized, increased communication and coordination between CARB and MCAQMD is needed to effectively maintain the ambient air monitoring network in Mendocino County.

Network Management

There are four monitoring sites in Mendocino County. As identified in Table 5, four sites are operated by MCAQMD.

Table 45. Ambient Air Monitoring Network in Mendocino County, California

AQS ID	Station	Ozone	PM ₁₀ continuous	PM _{2.5} continuous
06-045-0002	Fort Bragg		X (POC 2)	
06-045-0006	Ukiah Library			X (POC 3)
06-045-0008	Ukiah AQMD (Gobbi)	X (POC 3)		
06-045-2002	Willits			X (POC 1)

The MCAQMD network is included as part of CARB's Annual Monitoring Network Plan. If MCAQMD seeks to make changes to its network outside the Annual Monitoring Network Plan process, the district generally works with CARB to resolve potential issues.

The minimum monitoring requirements as outlined in 40 CFR 58, Appendix D for PM₁₀, PM_{2.5} and ozone are met.

Field Operations

MCAQMD operates a network of O₃ and PM monitoring instruments. The following manager and staff are currently responsible for field operations:

- Chris D. Brown – Air Pollution Control Officer
- Bob Scaglione – Senior Air Quality Specialist

The field technician exhibited a thorough knowledge of equipment operations. Some quality control checks and maintenance are performed in accordance with EPA regulations. Field technicians are responsible for day-to-day operations as well as instrument repair and maintenance at their assigned stations. CARB performs calibrations of all instruments twice a year and performs audits twice a year.

The monitoring stations operated by the district are set up to perform automated QC checks. Zero/span checks for ozone are programmed to occur weekly at 3 a.m., and one-point precision checks are performed manually about once a week. Leak checks of PM instruments are performed once per month. MCAQMD does not consistently complete and document monthly flow checks on PM instruments.

MCAQMD uses CARB SOPs, however, hardcopies of the SOPs were not available and staff were unaware of where electronic versions were kept. Site operators have the instrument manuals but not the SOPs. Several types of documents are used to track performance and maintenance at the four sites, including station logs, a monthly maintenance and service log for the PM sites, a weekly QA/QC checklist and separate maintenance log for the ozone site. Logs and checklists are archived into binders at the Ukiah AQMD office. If anything unusual is noted, this information is passed along to CARB data validators with the email that conveys the data.

Corrective actions and repair/maintenance are dealt with on a case-by-case basis. Generally, minor equipment repairs are performed by MCAQMD, while major repairs are performed by the CARB.

Laboratory Operations

MCAQMD relies on CARB for laboratory, calibration, and audit support. MCAQMD staff make periodic visits to the CARB Sacramento office.

Data Management

Currently, neither MCAQMD nor CARB are assessing whether the required data quality objectives and measurement quality objectives have been achieved.

MCAQMD station operators perform a preliminary assessment of the gaseous and continuous PM₁₀ and PM_{2.5} raw data, though this process is generally not documented or preformed with a predefined set of SOPs or other procedures outlined in a relevant QAPP. Raw text files are sent to CARB for submission to AQS, along with any relevant notes. After AQAS staff has uploaded the data to AQS, an email confirming the upload is sent to the district (to the staff who originally provided the data), which has attached the AQS raw data report and raw data inventory report. There is little communication from CARB back to MCAQMD after this data submittal, and The MCAQMD does not subsequently check what is uploaded into AQS.

QA/QC

MCAQMD conducts some QA/QC activities while relying on CARB to support other QA/QC activities. QA/QC activities conducted by MCAQMD include one-point QC checks for gaseous monitors. MCAQMD inconsistently performs monthly flow verifications for PM₁₀ and PM_{2.5}. CARB also conducts the following QA/QC activities: semi-annual calibrations, ~~and~~ semi-annual audits for ozone, PM₁₀ and PM_{2.5}, and ozone, flow, and gaseous certifications and calibrations lab services.-

OVERVIEW OF SAN JOAQUIN VALLEY AIR POLLUTION CONTROL DISTRICT'S AIR MONITORING PROGRAM

As part of the CARB TSA, EPA also reviewed the ambient air monitoring activities of the San Joaquin Valley Air Pollution Control District (SJVAPCD). The SJVAPCD is currently part of the ARB PQAQ but this audit included an agency specific assessment of network design, field operations, data handling, quality assurance and quality control procedures. EPA staff interviewed SJVAPCD management and staff and performed site evaluations at Fresno-Drummond, Clovis, Tranquility, Hanford, as well as site visits to Huron and Corcoran.

The SJVAPCD managers and staff were very accommodating, making themselves and their staff available for many interviews, procedural reviews and monitoring site visits. Management and staff interviewed were:

Michael Carrera – Central Region Compliance Manager
Nathan Trevino – Supervising Air Quality Instrument Technician
Ashley Ross – Air Quality Instrument Technician
Olan Bailey – Air Quality Instrument Technician
Errol Villegas – Air Quality Planning Manager
Steve Shaw – Supervising Air Quality Specialist, Air Quality Analysis Group
Peter Biscay – Air Quality Specialist, Air Quality Analysis Group
Jennifer Ridgway – Air Quality Specialist, Air Quality Analysis Group

Overall, the monitoring and data analysis staffs are very dedicated and knowledgeable, operating the monitoring network and producing high-quality data to the best of their ability. As described in the attached findings, the major deficiency in the monitoring program is the lack of a structured and formalized framework that is inherent to a functioning quality system required for ambient air monitoring. Some of the findings in this TSA pertain to CARB's role as the lead agency in the CARB PQAQ and their relationship and oversight responsibilities to local districts within the PQAQ. While the PQAQ relationship between local districts and CARB has not been formalized, increased communication and coordination between CARB and SJVAPCD would help to maintain the ambient air monitoring network in the San Joaquin Valley.

Network Management

At the time of this TSA there were 31 monitoring sites in the San Joaquin Valley APCD. Twenty-one sites are operated by SJVAPCD, 8 sites are operated by CARB and 2 sites are operated jointly by CARB and SJVAPCD (Table 2). In addition to those sites, there are two sites operated by the National Park Service and one site operated by the Tachi Yokut Tribe on the Santa Rosa Rancheria within the San Joaquin Valley APCD.

The SJVAPCD submits its own Annual Monitoring Network Plan directly to EPA that addresses all these sites within their jurisdiction. In general CARB and SJVAPCD have worked informally to address some network modifications; finding SJV4 addresses the deficiencies in this process. Ideally, if SJVAPCD seeks to make changes to their network in the SJV outside the Annual Monitoring Network Plan process, the district should work with CARB and EPA to ensure that

the monitoring requirements are met and should submit a letter directly to EPA requesting approval of the modification per 40 CFR 58.14.

The minimum monitoring requirements as outlined in 40 CFR 58, Appendix D for O₃, NO₂, CO, PM_{2.5}, PM₁₀, PAMS and NCore are met. However, there are outstanding network modifications that have not been approved for the following sites: Corcoran, Bakersfield-Golden State Highway, [and](#) Arvin-Bear Mountain Road (CARB site).

Field Operations

The SJVAPCD operates a network of O₃, NO₂, CO, PM_{2.5}, PM₁₀, and PAMS monitoring instruments. The following manager(s) and staff are responsible for Field Operations:

- Michael Carrera – Central Region Compliance Manager
- Nathan Trevino – Supervising Air Quality Instrument Technician

The SJVAPCD field technicians interviewed exhibited a thorough knowledge of equipment operations and an interest in producing high quality data that meet all the regulatory requirements. Most quality control checks and maintenance are performed in accordance with EPA regulations. Field technicians are responsible for day-to-day operations as well as instrument preventive maintenance and minor repairs at their assigned stations. If the repairs are major and cannot be completed by the staff at the headquarters office, the instruments are sent to the manufacturer. The senior air quality instrument technician performs calibrations of the monitors at the required frequency. The monitoring group schedules routine maintenance and calibrations together to reduce instrument downtime between modifications to an instrument and the required follow-up calibration. SJVAPCD relies primarily on [CARB's Standards Laboratory for ozone, flow, and gaseous certifications and calibrations and instrument manufacturers or gas suppliers for ozone primary standard verification, protocol gas certification, and](#) major instrument repair.

The monitoring stations operated by the district are set up to perform automated QC checks daily on gaseous instruments using certified standards, which exceeds EPA requirements. ~~Flow verifications are performed every quarter for manual PM₁₀ samplers, and semiannually for manual PM_{2.5} samplers.~~ Flow verifications are performed quarterly for manual PM₁₀ samplers, semiannually for manual PM_{2.5} samplers, and biweekly for continuous PM_{2.5} and PM₁₀ samplers.

All stations maintain log books to document site visits, preventive maintenance, resolution of operational problems, and corrective actions taken. Logbooks were generally detailed, but what is recorded could be more standardized. Operators archive full station logbooks at the central monitoring office. Other station records include QC checklists and maintenance sheets that are also archived at the monitoring station and at the central office. All necessary calibration information is available to the field operators.

Corrective actions and repair/maintenance are dealt with on a case-by-case basis in a responsive and timely fashion; however, a formalized corrective action process would help document decisions or solutions and help communicate them to all field personnel.

The SJVAPCD does not operate a laboratory but relies on Ventura County APCD for PM weighing laboratory support and on a contract laboratory for PAMS analyses.

Data Management

SJVAPCD manages all of the ambient monitoring data generated and uploaded to AQS by the district. Data quality objectives and measurement quality objectives have been defined for the SJVAPCD's program. Station operators perform data collection and sample handling according to specific SOPs for most pollutants and the first level data validation for their stations. The monitoring senior and supervisor observe activities on an ongoing basis to provide the oversight to ensure full implementation of current and recently changed procedures.

The supervising air quality instrument technician verifies and validates data through level two validation and the supervising air quality specialist and staff in the Air Quality Analysis group perform level three. Based on a Memorandum of Understanding with the District, CARB and EPA, SJVAPCD submits gaseous and continuous PM data to AQS. Prior to submitting the data to AQS, Air Quality analysis staff complete a two-page checklist to document the review elements. Filter based PM₁₀ and PM_{2.5} data are processed, validated, and submitted to AQS by Ventura County APCD that follows procedures outlined in its agency specific QAPPs and SOPs.

QA/QC

The SJVAPCD conducts some QA/QC activities while relying on CARB to support others. QA/QC activities conducted by SJVAPCD includes: zero, precision and span checks, routine maintenance and calibrations. CARB conducts the following QA/QC activities: annual performance audits and NPAP audits for gaseous instruments and one of the semiannual flow audits of PM instruments. EPA's contractor performs the remaining semiannual flow audit and the PM_{2.5}-PEP audits. Beginning in January 2012, CARB will conduct both of the semiannual flow audits. The SJVAPCD follows its own SOPs, but does not have SOPs for some activities, nor up-to-date QMP or QAPPs. The SJVAPCD does not have an independent QA manager responsible for overseeing the agency's Quality System. However, the District does provide some independence in the activities that would typically fall to a QA manager by having operations, calibrations performed by different people and the third level data review and validation is separated from field operations and data collection by two levels of management. CARB's audits, which include siting evaluations, and future TSA's performed by CARB also provide independent oversight of the District's operations.

FINDINGS

Program Area	Finding Numbers	EPA Contact
General	G1-G6	Audit Team
Network Management	NM1-NM3	Meredith Kurpius
Field Operations	FO1-FO18	Gwen Yoshimura
Data Management	DM1-DM9	Meredith Kurpius
QA Management	QA1-QA6	Mathew Plate
PM Laboratory	PM1-PM4	Michael Flagg
Toxics Laboratory	TL1-TL22	Steve Remaley
Imperial County APCD	IMP1-IMP10	Michael Flagg
Mendocino County AQMD	MEN1-MEN12	Gwen Yoshimura
San Joaquin Valley APCD	SJV1-SJV12	Kate Hoag

Finding #	G1
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	General

Finding:

[Previous Finding M1] CARB needs to complete the process of putting a formal PQAO into place.

Description:

CARB has taken steps to strengthen the CARB PQAO by:

- Appointing a PQAO contact
- Improving the field audit and technical audit program of PQAO districts
- Beginning to provide QA training
- Reviewing PQAO districts' quality control data prior to routine data certifications
- Beginning to review PQAO districts' SOPs
- Starting a process to put in place agreements with PQAO districts
- Evaluating and controlling the standards used by the PQAO through the standards laboratory and during technical audits

~~In developing and maintaining a common PQAO, CARB is able to save significant resources by:~~

- ~~Reducing the number of collocated monitoring sites~~
- ~~Reducing the number of oversight audits required~~
- ~~Centralizing expertise and reducing redundant positions~~
- ~~Leveraging district resources to operate monitoring sites that otherwise would be required to be operated by CARB~~
- ~~Reducing the number of redundant data reporting systems~~

The CARB PQAO is able to produce data of known quality that can withstand legal and technical challenges to state and Federal regulatory decisions.

In order to complete the process of integrating CARB's PQAO districts into a formal PQAO, the organization should be defined in greater detail. It should be noted that a PQAO can only be created and maintained if the organization conforms to the five criteria defined by EPA regulation.

CARB has begun to define the organization of the PQAO by identifying contacts and performing outreach to the PQAO districts. In order to fully define the PQAO CARB must:

- Formally identify which districts, monitoring sites, and pollutants are included
- Complete the process of having formal agreements in place between the districts and CARB
- Develop and implement an organized and comprehensive training program to support the CARB PQAO
- Complete the CARB Quality Management Plan that defines PQAO organization, roles,

Comment [A31]: It is extremely unlikely that taking on new PQAO responsibilities will save CARB any resources.

and activities

In order to strengthen the PQAO so that it produces data of known and consistent quality, CARB should continue working to meet the five criteria. Below is a summary of the work to which CARB has committed to achieve this goal.

(1) Although the CARB does not have a common group of field operators, CARB can continue to take steps to ensure that all PQAO field operators have common background and support by:

- Implementing routine training programs that are available to all personnel in the PQAO
- Increasing the level of technical support that is available to PQAO districts
- Enhancing communication between CARB and the PQAO districts

(2) The CARB PQAO has a common QA plan and SOPs. In order to ensure that the procedures described are consistently followed throughout the PQAO, CARB should:

- Continue to update these documents and inform and train PQAO staff on changes
- Continue to review and approve SOPs from PQAO Districts, and make these SOPs available to the entire PQAO
- Continue to evaluate adherence of PQAO districts to these QA plans and procedures

(3) The CARB PQAO has a common standards laboratory, but ~~many~~ some PQAO standards are certified by outside sources. To ensure comparable standards throughout the PQAO, CARB should:

- Continue to inventory all the standards used by the PQAO and their traceability
- Continue to evaluate the performance of standards sent to the standards laboratory and issue corrective actions as necessary
- Determine the need to consolidate some of the standards/standard certifications used by the PQAO in order to promote consistency and save resources

(4) The CARB PQAO has a common QA/QC evaluation group. However, most of the PQAO Districts do not have QA support staff except those available from CARB. In order to meet the criteria for a common QA, CARB needs to:

- Create a line of QA communication between PQAO staff and QA staff that is separate from the audit process
- Continue to work on corrective action processes which PQAO district staff can use to elevate QA issues to CARB's QA program
- Ensure that consistent data validation procedures are in place

(5) The CARB PQAO does not have support of common management, headquarters, or laboratory facilities, with the exception of some analytical laboratory analyses performed by the MLD laboratory for some districts. CARB should promote common management practices by:

- Creating standards for oversight of monitoring stations and operations
- Providing training to monitoring managers

References:

40 CFR Part 58, Appendix A

3.1 Primary Quality Assurance Organization. A primary quality assurance organization is defined as a monitoring organization or a coordinated aggregation of such organizations that is responsible for a set of stations that monitors the same pollutant and for which data quality assessments can logically be pooled. Each criteria pollutant sampler/monitor at a monitoring station in the SLAMS network must be associated with one, and only one, primary quality assurance organization.

3.1.1 Each primary quality assurance organization shall be defined such that measurement uncertainty among all stations in the organization can be expected to be reasonably homogeneous, as a result of common factors. Common factors that should be considered by monitoring organizations in defining primary quality assurance organizations include:

- (a) Operation by a common team of field operators according to a common set of procedures;
- (b) Use of a common QAPP or standard operating procedures;
- (c) Common calibration facilities and standards;
- (d) Oversight by a common quality assurance organization; and
- (e) Support by a common management, laboratory or headquarters.

QA Handbook Volume II

4.2 Training

. . . Appropriate training should be available to employees supporting the Ambient Air Quality Monitoring Program, commensurate with their duties. Such training may consist of classroom lectures, workshops, web-based courses, teleconferences, vendor provided, and on-the-job training.

Recommendation to Address Finding:

CARB should formalize the PQAO and enhance interactions with the PQAO districts to ensure that the five PQAO criteria are being met.

Finding #	G2
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	General

Finding:
QA does not have the structure and staff to manage QA oversight of the PQAO districts.
Description:
Oversight by CARB of QA activities of the air monitoring programs by local districts within the CARB PQAO is needed. By appointing the QMB Chief as the primary QA contact for the PQAO Districts, the clear QA authority for oversight of the PQAO Districts rests with the QMB. Formal agreements between the Districts and CARB are needed to support this authority, as noted in Finding G1. In order for the QMB to meet these needs, the QMB will will need to develop a corresponding organization structure and staff expertise.
References:
40 CFR Part 58, Appendix A
2.2 Independence of Quality Assurance. The monitoring organization must provide for a quality assurance management function- that aspect of the overall management system of the organization that determines and implements the quality policy defined in a monitoring organization's QMP. Quality management includes strategic planning, allocation of resources and other systematic planning activities (e.g., planning, implementation, assessing and reporting) pertaining to the quality system. The quality assurance management function must have sufficient technical expertise and management authority to conduct independent oversight and assure the implementation of the organization's quality system relative to the ambient air quality monitoring program and should be organizationally independent of environmental data generation activities.
Recommendation to Address Finding:
The QMB should develop the expertise, organization, and tools to oversee the CARB PQAO effectively.

Comment [A32]: Providing examples of what is expected would be helpful in complying with the recommendation.

Finding #	G3
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	General

Finding:
[Previous Finding M6] While progress has been made on updating the CARB QA Manual with a QMP and QAPPs or equivalent documents, the process is behind schedule and is not moving forward <u>and is progressing as resources allow</u> .
Description:
The CARB QA Manual was regularly updated until 2007. Based on EPA's TSA finding in 2007, CARB agreed to update or replace the QA Manual with a document that conformed to the requirements of the EPA QA system. In order for CARB's system to be up-to-date, complete, and useful, current QA planning documents should be place in 2012. In addition, QAPPs/SOPs should be revised when standards or instruments change.
References:
In accordance with 40 CFR Parts 31 and 35, grant recipients are required to document their quality systems. Specific ambient air monitoring requirements are found in 40 CFR, Part 58, Appendix A, Section 2.1, "EPA Requirements for Quality Management Plans (QA/R-2)", EPA/240/B-01/002, March 2001 and "EPA Requirements for QA Project Plans (QA/R-5)", EPA/240/B-01/003, March 2001.
Recommendation to Address Finding:
CARB should complete updating QA planning documents by June 30, 2012. SOPs should be updated and submitted with updated QAPPs, following a clear timeline. The QMP and QAPPs should be reviewed and resubmitted to EPA for approval every 5 years.

Finding #	G4
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	General

Finding:
Local districts within the CARB PQAO do not always have updated quality system documentation for all activities.
Description:
Quality system documents include Quality Management Plans (QMPs), Quality Assurance Project Plans (QAPPs), and Standard Operating Procedures (SOPs). Local districts within the CARB PQAO can either adopt CARB's quality system documents or prepare their own. EPA found that not all local districts within the CARB PQAO have their own approved quality system documents or use CARB's (see Findings MEN1, IMP1, and SJV2)
References:
40 CFR 58 App. A 2.0, Quality System Requirements QA Handbook for Air Pollution Measurement Systems, Volume II, EPA-454/b-08-002
40 CFR 58 App. A 2.1, Quality Management Plans and Quality Assurance Project Plans QA Handbook for Air Pollution Measurement Systems, Volume II, EPA-454/b-08-002
Further guidance on developing QAPPs can be found in the guidance documents "EPA Requirements for Quality Assurance Project Plans," EPA/240/B-01/003, March 2001, and "Guidance for Quality Assurance Project Plans," EPA/240/R-02/009, December 2002
Recommendation to Address Finding:
Each local district within the CARB PQAO needs to have its own quality system documents approved by CARB or formally adopt the CARB quality system documents. CARB should oversee adoption and approval of quality system documents within the CARB PQAO.

Finding #	G5
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	General

Finding:

[Previous Findings QM1 and M3] QA Authority and interactions between QMB and the other Branches should be expanded and formalized. The corrective action system should be developed to include actions taken in addition to reports issued by the QA auditors and the calibration laboratory.

Description:

Based on feedback and observations made during the audit, CARB MLD is relying on the QMB to provide independent QA leadership. In order for the QMB to fulfill this role, the other MLD Branches should acknowledge the QMB's QA authority and staff people should be able to raise QA issues to the QMB. The QMB should be able to exercise QA authority and oversight in a judicious and cooperative manner.

The QMB should be involved in:

- Planning air monitoring activities and programs
- Overseeing the implementation of monitoring
- Evaluating monitoring data and programs

In addition to QA/QC support, the specific tasks that must be conducted by the QA independently are:

- Implementation of the QMP
- Review and approval of QAPPs and other monitoring plans
- Review and approval of QA components of SOPs
- ~~Review of performance evaluations~~
- Approval of formal corrective actions
- Provide QA system training
- Ensure that required training has been implemented
- Perform periodic internal audits (performance, technical, and data)
- Review of data quality summaries and/or control charts (including AMP255 reports)
- Evaluation of data validation process/reports
- Evaluation of final data used to make regulatory decisions

Several specific issues were noted that should be addressed and may be indicative of the broader issue of the QMB's role in providing independent QA.

- The QMB Chief was unclear as to the extent of his authority and oversight over the AQSB
- The AQSB was hesitant to characterize the QMB's role in special projects as oversight
- The QMB does not have approval authority for SOPs produced by the other MLD branches

Comment [A33]: If referring to staff performance evaluations, delete this bullet

Comment [A34]: The QMB chief is clear on the extent of his authority. However, it may not meet your expectations as to what it should be for various reasons (i.e., resources).

- Updates to the new QAPP sections requested by QMB from the other branches have not been completed
- New monitoring projects were initiated without QMB involvement in the planning process
- During field audits, the auditors perform instrumental tasks that are the responsibility of the station operators. This level of cooperation between the QAS and AQSBS is not ideal, as it undermines the organizational independence of the quality system.

Comment [A35]: This finding needs more clarification as to what tasks were performed. Typically, staff only perform tasks to assist in completing the performance audit.

Regarding Corrective Actions:

The CARB QMB has expanded the corrective action (Air Quality Data Action (AQDA)) process to include calibration laboratory and siting. However, the CARB PQA has not established a corrective action process that is comprehensive and can be initiated by staff outside of the ~~QAS~~ **QMB**, including district staff. When a significant quality problem or area for improvement is identified, there should be a formal process to ensure that the problem is addressed comprehensively throughout the PQA. The process should be “blind” to the initiator; it should allow for bottom-up, non-punitive initiation of formal corrective actions.

EPA noted several issues (see specific findings) identified by staff during interviews that should have been elevated as formal corrective actions that required systematic changes.

References:

40 CFR Part 58, Appendix A

2.2 Independence of Quality Assurance. The monitoring organization must provide for a quality assurance management function- that aspect of the overall management system of the organization that determines and implements the quality policy defined in a monitoring organization's QMP. Quality management includes strategic planning, allocation of resources and other systematic planning activities (e.g., planning, implementation, assessing and reporting) pertaining to the quality system. The quality assurance management function must have sufficient technical expertise and management authority to conduct independent oversight and assure the implementation of the organization's quality system relative to the ambient air quality monitoring program and should be organizationally independent of environmental data generation activities.

EPA QA/R-2

3.11 QUALITY IMPROVEMENT

Purpose – To document how the organization will improve the organization's quality system.

Specifications – Identify who (organizationally) is responsible for identifying, planning, implementing, and evaluating the effectiveness of quality improvement activities and describe the process to ensure continuous quality improvement, including the roles and responsibilities of management and staff, for:

- ensuring that conditions adverse to quality are:
 - prevented,

o identified promptly including a determination of the nature and extent of the problem
Recommendation to Address Finding:
The independent nature of the QA role in the QMB should be formalized and detailed in the CARB QMP. Additionally, it is recommended that the QMB approach QA tasks in manner that balances independence and cooperation.

Comment [A36]: Finding states QMB role/authority should be expanded and formalized; recommendation only discusses the independence of QMB

Finding #	G6
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	General

Finding:
Coordination between CARB and districts (e.g., Imperial County, SJV, and Mendocino County) and EPA needs to be improved.
Description:
<p>Several findings identified during this TSA relate to insufficient coordination and communication between CARB and the local districts within the CARB PQAO, including:</p> <ul style="list-style-type: none"> • New valid PM_{2.5} samples found at San Diego that impacted a regulatory decision • Issues with CARB data validation for Imperial and Mendocino • Lack of familiarity with QMP, QAPPs, SOPs • Site relocation of high concentration sites in the San Joaquin Valley <p>CARB and the local agencies must all take ownership of the data and data quality and work together to develop processes to avoid the recurrence of similar problems.</p>
References:
Recommendation to Address Finding:
Develop a process to routinely share information with districts (e.g., a PQAO listserve). Provide a mechanism for resolving issues between the agencies in a well-documented and transparent manner. Articulating clear expectations of the roles and responsibility of all the agencies in the PQAO through an MOU, as suggested by the PQAO strategy, would also provide a framework for developing such processes.

Comment [A37]: Remove the bullet

Finding #	NM1
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Network Management

Finding:

~~Not all agencies~~ Two agencies within the PQAO do not have an approved network plan. The current network plan process does not ~~allow~~ provide for a determination of network adequacy on a statewide basis.

Description:

There are 35 local air pollution control districts in the state of California (Table 1). Three of these local air districts, Bay Area AQMD, South Coast AQMD, and San Diego County APCD are their own PQAO and submit annual monitoring network plans. The remaining 32 districts are within the ARB PQAO. ~~Twenty-one of the remaining~~ air districts plus CARB collect ambient air monitoring data under the CARB PQAO. ~~Eleven of the twenty-one~~ In 2012, nine of the districts ~~agencies~~ within the CARB PQAO will prepare and submit their own annual monitoring network plan. CARB prepares and submits an annual monitoring network plan for the 23 remaining local districts in California and for its network. All districts in California except for Mojave/Antelope were covered in a network plan in 2011. Not all local districts within the CARB PQAO that have assumed responsibility for submitting an annual monitoring network plan have fulfilled the obligation (e.g., Northern Sierra AQMD, Mojave Desert AQMD, and Antelope Valley APCD). As a result, regulatory monitors in the Mojave and Antelope districts are being operated without an approved annual monitoring network plan.

Although the network plans for California have been approved by Region 9, ~~The~~ current system of multiple network plans produces information that cannot be easily combined. Since monitoring network requirements often span multiple districts, plans that contain inconsistent information do not ~~allow~~ provide for a determination of network adequacy on a statewide basis, which is required as part of the annual monitoring network plan process.

References:

40 CFR 58.10(a) addresses network plan requirements.

Recommendation to Address Finding:

EPA recommends that CARB compile an overlay of information from the annual monitoring network plans that are submitted by local districts in the State of California. To accomplish this, EPA suggests that:

- All local districts that submit annual monitoring network plans for the State of California provide a copy to CARB no later than the time of the annual monitoring network plan submittal.
- CARB compiles information from the plans addressing key requirements that apply across multiple districts (e.g., minimum monitoring requirements and co-location requirements).
 - This summary should be created between the deadline for Annual Network Plan submittal (July 1) and 30 days prior to annual monitoring network plan approval (Nov. 1)

Comment [A38]: Again, need to reconcile number with other places in document. This is correct number

- After receiving network plans, CARB should work with districts on missing/deficient information.
 - If this summary contains information that is different from what was submitted in annual monitoring network plans, CARB should provide an opportunity for public comment.
- EPA review the submitted plans and the CARB summary and document the basis for approval/disapproval decisions.
- If a district that has responsibility for submitting a plan does not fulfill its obligation, CARB will provide the required information for that year.

Finding #	NM2
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Network Management

Finding:
The network assessment does not meet all CFR requirements.
Description:
Several districts submit separate network assessments for the State of California. Since requirements for the ambient air monitoring network extend beyond the boundaries of local districts, the assessment must be done at a multi-jurisdictional level. The CARB network assessment for small agencies did not address whether new sites were needed, whether existing sites were no longer needed and could be terminated, or whether new technologies were appropriate for incorporation into the ambient air monitoring network, as required by CFR.
References:
40 CFR 58.10(d) addresses network assessments and states: <i>“The State, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network.”</i>
Recommendation to Address Finding:
CARB should conduct its own state-wide assessment. Alternatively CARB could develop a process to compile and synthesize information from network plans from local districts into a comprehensive network plan that addresses the CFR requirements.

Comment [A39]: (Factual correction, ARB's network assessment for small agencies found that (at the time the report was drafted), the minimum monitoring requirements were met, the monitoring objectives defined in appendix D were met, all operating sites were critical for the implementation of State and federal air quality standards, and none were proposed to be discontinued).

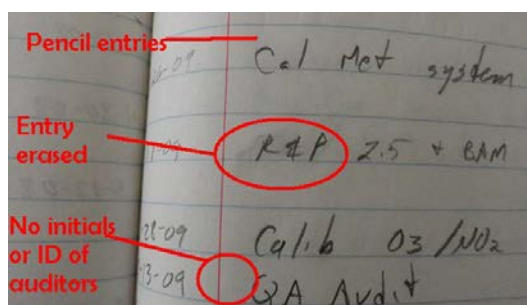
Finding #	NM3
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Network Management

Finding:
There are PM ₁₀ monitors listed in local conditions (LC; parameter code 85101), but not Standard Temperature and Pressure (STP; parameter code 81102 in AQS).
Description:
<p>All PM₁₀ measurements collected with FRM/FEM instruments are required to be entered into AQS as STP (parameter code 81102). It is acceptable to report data under both parameter codes. The following CARB monitors were identified as entered under only LC code:</p> <ul style="list-style-type: none"> • South Lake Tahoe (060170011), POC 2 • Mojave – Poole (060290011), POC 3 • Bakersfield – California (060290014), POC 5 • Paso Robles (060792004), POC 2 • San Luis Obispo (060794002), POC 3 • Santa Barbara (060830011), POC 1 • Santa Maria (060831008), POC 2 <p>The following non-CARB sites that are within the CARB PQAQ were identified as being entered under only LC code:</p> <ul style="list-style-type: none"> • Brawley (060250007), POC 3, Imperial County APCD • Niland (060254004), POC 3, Imperial County APCD • Corcoran (060310004), POC 7, San Joaquin Valley APCD • Madera (060392010), POC 3, San Joaquin Valley APCD • Lakeport (060333001), POC 2, Lake County AQMD • Anderson Springs (060333010), POC 1, Lake County AQMD • Glenbrook (060333011), POC 1, Lake County AQMD • Nipomo (060794002), POC 2, San Luis Obispo County APCD
References:
40 CFR 50, Appendix J, Section 2.2
Recommendation to Address Finding:
CARB should change or add the parameter code for the CARB sites listed above to STP (81102). CARB should work with non-CARB districts within its PQAQ to have the non-CARB sites listed above changed to STP (i.e., parameter code 81102).

Comment [A40]: This section of the CFR only references Filter Samples not continuous data?

Finding #	FO1
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field

Finding:
[Related Previous Findings GB3, SJV3, & NS2] Documentation at the CARB field sites is inadequate and not reviewed by management.
Description:
<p>The level and consistency of documentation at the AQSB managed field stations was inadequate to reconstruct accurately the monitoring that was conducted and to resolve definitively the data quality issues identified.</p> <p>AQSB site operators use a variety of different documents to record information pertaining to site operations. These include station logbooks, station maintenance sheets, paper strip charts, and data report sheets. Field staff also do not consistently document when they notice something out of the ordinary about the site that could impact readings (construction, weather).</p> <p>Several specific issues regarding documentation were noted</p> <ul style="list-style-type: none"> • There is no clear direction as to where information regarding instrument issues that could impact the validity of data is recorded and how such information is transmitted to the data validators. • It is not clear that information recorded by the site operators on monthly data reports is retained as an official record. • There is not recent evidence that there has been management review of the documentation produced by the station operators. • Initials do not routinely accompany entries. • Use of pencil and erasing of records was observed. • Use of white-out on Chain of Custody forms was observed. • Entries in logbooks are incomplete, without sufficient information as to who was present at the site, serial numbers of problematic instruments, descriptions of actions taken, and how much data could be impacted.



- There are no field maintenance logbooks for instruments (logs are kept at the repair shop).

MLD should develop a consistent approach to site documentation and review. This may involve a short-term solution to improve documentation consistency and completeness and a long term solution to convert all site documentation to electronic records that can be more efficiently produced, reviewed, and incorporated into the data validation process.

References:

QA Handbook Volume II, Section 5

2003 NELAC Standard (Quality Systems Section)

5.5.5.5 The laboratory shall maintain records of each major item of equipment and its software significant to the environmental tests performed. The records shall include at least the following:

- the identity of the item of equipment and its software;
- the manufacturer's name, type identification, and serial number or other unique identification;
- checks that equipment complies with the specification (see 5.5.5.2);
- the current location;
- the manufacturer's instructions, if available, or reference to their location;
- dates, results and copies of reports and certificates of all calibrations, adjustments, acceptance criteria, and the due date of next calibration;
- the maintenance plan, where appropriate, and maintenance carried out to date; documentation on all routine and non-routine maintenance activities and reference material verifications.
- any damage, malfunction, modification or repair to the equipment.
- date received and date placed in service (if available);
- if available, condition when received (e.g. new, used, reconditioned);

Recommendation to Address Finding:

Field documentation should be improved and a process developed and implemented to provide defensible electronic documentation. See Finding SJV7 Description section for recommendations as to the type of standard information that could be included in logbooks.

Comment [A41]: Does this Reference apply to Air Monitoring Operations?

Finding #	FO2
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:
Management oversight of site operators needs strengthening.
Description:
As stated in Finding FO1, the site operators are not consistently following EPA regulations and guidance for regulatory ambient air quality data collection. Due in part to the geographic extent of the network, management oversight of the site operations is especially challenging. Nonetheless, procedures for management controls are needed to ensure that site operations produce robust data for regulatory decisions.
References:
Recommendation to Address Finding:
EPA recommends that managers develop checklists and conduct regular site visits. It may be helpful for the managers to participate in routine training for field operators so the knowledge base is similar. EPA also recommends using the logbooks and other records (e.g., maintenance logs and calibration sheets) as oversight aids. To this end, electronic records may be useful.

Comment [A42]: Which ones??

Finding #	FO3
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:
CARB field operators have not been trained on new SOPs.
Description:
CARB field operators were generally proficient with the procedures they use to conduct their monitoring activities; however, field operators did not always understand why it was important to follow specific protocols and were found to be lax in following requirements in some instances. Further, it was noted that this training and/or demonstration of proficiency was not adequately documented.
References:
Recommendation to Address Finding:
CARB should develop a formal system to ensure and document that all staff are familiar with the quality management system and are trained and proficient at the monitoring tasks that they are performing. Such a system could include: trainings for field staff when SOPs are developed or revised; periodic refresher courses; monthly site operator meetings; regular manager visits to sites; standard logbooks that get checked and signed off on regularly.

Finding #	FO4
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:
Residence time calculations were not available at all CARB sites visited.
Description:
<p>Residence time is defined as the amount of time it takes for a sample of air to travel from the opening of the cane to the inlet of the instrument. 40 CFR Part 58, Appendix E Section 9 states that for the reactive gases (O₃, NO₂, and SO₂) residence times must be less than 20 seconds. Additionally, it is recommended that the residence time within the manifold and sample lines to the instruments be less than 10 seconds. The station technicians should calculate the residence time, document it in the station logbook, and periodically verify the data.</p> <p>There were no clear records of residence time of the sampling lines at each site. The site operators did not know how recently the residence time had been recalculated. At a minimum, the residence time should be calculated for each instrument after any change is made to the sampling train, such as the removal or addition of other instruments, and posted at each site.</p> <p>The station technicians should calculate the residence time, document it in the station logbook or other form available at the site, and periodically verify the measurement.</p>
References:
40 CFR Part 58, Appendix E Section 9
Recommendation to Address Finding:
<ul style="list-style-type: none"> - Calculate residence times for all gaseous monitors. - Modify sites with residence times in excess of 20 seconds with a goal of 10 seconds and evaluate any impact on compliance data due to excessive residence times. - Have residence time calculated and posted or accessible on-site.

Finding #	FO5
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:
Delay in sending PM _{2.5} samples has resulted in loss of data.
Description:
PM _{2.5} samples are subject to a maximum of a 30-day hold time between when samples are taken and subsequently conditioned and weighed. If samples are not maintained at temperatures below the average ambient temperature during sampling then the hold time is limited to 10 days. Samples at one site, Yuba City, were held too long at station post-collection, resulting in immediate conditioning/weighing in laboratory (12/4/10) and occasional invalidation (9/22/10 and 6/17/10 through 6/20/10).
References:
40 CFR 50, Appendix L, Section 8.3.6
Recommendation to Address Finding:
PM _{2.5} samples should be sent within 15 days of when the sample was collected to the laboratory. Field operation managers should ensure that the protocol is followed.

Finding #	FO6
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:
Samples that CARB intends to be used as “make up” samples are not being taken in accordance with EPA guidance.
Description:
According to EPA’s April 1999 <i>Guideline on Data Handling Conventions for the PM NAAQS</i> , PM ₁₀ make up samples may count toward completeness when collected exactly 7 days after a scheduled sample or if they are collected between the missed sample day and the next scheduled sample.
References:
http://epa.gov/ttncaaa1/t1/memoranda/pmfinal.pdf , pg 32-33
Recommendation to Address Finding:
Ensure that the PM ₁₀ QAPP/SOP describes this situation, and that the field operators are aware of this provision.

Comment [A43]: Can’t be done on a 1 in 6 sample schedule?


Finding #	FO7
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

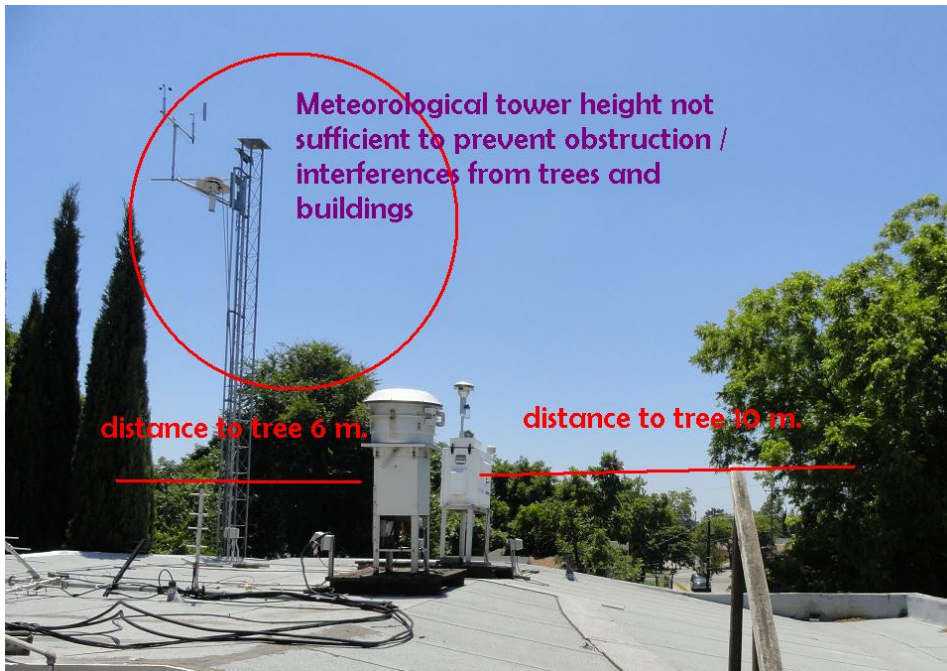
Finding:
PM ₁₀ QC checks are not consistently recorded. There is no document in which field operators are directed to record this information.
Description:
PM ₁₀ QC checks are being carried out by CARB field operators, but the checks are not consistently documented. The monthly check sheet does not have a monthly flow rate verification entry.
References:
Recommendation to Address Finding:
Include PM ₁₀ QC checks on the monthly check sheet or in some other document. Ensure that field operators consistently record the information.

Finding #	FO8
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:
CARB field staff do not check data after sending information to the CARB offices.
Description:
<p>Station operators were unable to account for some data in AQS. EPA found an instance where the station operator made an incorrect note, which resulted in a data point being entered into AQS when they should have been invalidated.</p> <p>CARB station operators make notes in the station log, on monthly check sheets, on strip charts, and on the monthly data report. They make notes on all flags contained in the monthly data report, edit the data, and then send everything to the CARB office. The CARB data validator reviews the information and calls with any questions.</p> <p>The station operators do not review the data after the data validator makes changes, and do not look at the data entered into AQS. They often are not aware that there has been a problem with the data, do not know why certain flags have been entered or why data were invalidated.</p>
References:
Recommendation to Address Finding:
Review CARB data validation SOP and determine if there should be an additional step where station operators review the data validator's changes or the AQS data entry.

Finding #	FO9
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:	
The Yuba City site has several significant siting issues that need to be resolved.	
Description:	
The Yuba City site monitors for the following pollutants for comparison to the NAAQS:	
<ul style="list-style-type: none"> • O₃ • NO₂ • PM₁₀ (high vol. filter-based) • PM_{2.5} (filter-based) 	
<p>The site also has a PM_{2.5} BAM that is use for non-NAAQS purposes.</p> <p>The monitors are on the roof of a small commercial building in a generally residential neighborhood. The gaseous probe is on the northeastern portion of the roof. The particulate monitors are on the southern portion of the roof and the BAM inlet is on the northwestern portion of the roof.</p>	
	
<p>The gaseous probe is within 3 meters of trees and 4 meters from the roadway. This probe must be at least 10 meters from the roadway and the drip line of adjacent trees. This could be resolved by moving the probe to the south and trimming the adjacent trees.</p>	
<p>The particulate monitors are within 6 meters of a tree(s) to the east and 10 meters of a tree to the southwest. The instruments must be at least 10 meters from adjacent trees (a distance of 20 meters is preferable). This could be resolved by trimming trees.</p>	



Also noted:

The meteorological tower is too short for the surrounding trees and buildings. It is recommended that this tower be elevated to 10 meters above the roof height, if possible. If the tower cannot be adjusted, the data should be used with caution.

The PM_{2.5} BAM is impacted by trees to the north and obstructed by the 2nd floor roof to the east. This location is not appropriate for NAAQS comparison.

References:

40 CFR Part 58 Appendix E

Recommendation to Address Finding:

Resolve siting issues by moving probes/monitors and/or trimming trees.

Comment [A44]: Previous page states that PM_{2.5} BAM used for non-NAAQS purposes

Comment [A45]: All data or BAM25.

Finding #	FO10
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:
Records indicate that calibrations of gaseous pollutant instruments are not consistently done according to a schedule.
Description:
CARB staff and management indicated that calibrations are performed every six months. Calibrations were typically done within the six-month timeframe, but there were instances where instruments were not calibrated for 9-16 months.
References:
<i>Quality Assurance Handbook for Air Pollution Measurement Systems, Volume 2</i> <ul style="list-style-type: none"> • Section 12.3 • Appendix D, O₃ Validation Template
Recommendation to Address Finding:
EPA recommends calibrating instruments every six months if zero/span checks are done biweekly and annually if zero/span checks are done daily.

Finding #	FO11
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:
[Previous Finding AQSB7] The number of NO ₂ titration points taken during calibration does not meet regulatory requirements.
Description:
EPA regulation requires that NO ₂ calibrations be verified with a minimum of 3 points; 5 points are recommended. The AQSB calibration group only takes 2 NO ₂ titration points.
References:
40 CFR Part 50, Appendix F describes the requirements for NO ₂ calibration. Section 1.5.9.4 states: “ <i>Maintaining the same FNO, FO, and FD as in section 1.5.9.1, adjust the O₃ generator to obtain several other concentrations of NO₂ over the NO₂ range (at least five evenly spaced points across the remaining scale are suggested).</i> ”
Recommendation to Address Finding:
Add at least one more titration point to NO ₂ calibrations.

Finding #	FO12
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:
Multi-point calibrations of PM _{2.5} instruments are not done routinely.
Description:
The AQSBS calibration group performs single point calibrations of PM _{2.5} instruments every six months. There is no provision for these instruments to be checked with a multi-point calibration on a regular basis, as required by 40 CFR Part 50, Appendix L. It is recommended that multi-point checks be performed annually for sampler flow. Multi-point checks of the PM _{2.5} sampler temperature and pressure sensors should also be performed if physically possible.
References:
40 CFR Part 50, Appendix L
<i>9.1.1 Multipoint calibration and single-point verification of the sampler's flow rate measurement device must be performed periodically to establish and maintain traceability of subsequent flow measurements to a flow rate standard.</i>
Recommendation to Address Finding:
Implement routine multipoint calibrations of PM _{2.5} instruments.

Comment [A46]: Specify Calibration versus verification? AQSBS does conduct multipoint calibrations. We do a (1) point verification.

Finding #	FO13
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations

Finding:
[Previous Finding AQSB8] AQSB is not formally documenting the quality of zero air being used in the program.
Description:
Zero air scrubbers are used in place of certified zero air for instrument calibrations. This is a common practice and acceptable. Because zero air is used to generate the zero point and the calibration mixes, it must be treated as a standard. As such, zero air scrubber maintenance and verification must be documented.
References:
QA Handbook Volume II
40 CFR Part 50, Appendix F
<i>1.3.2 Zero air. Air, free of contaminants which will cause a detectable response on the NO/NO_x/NO₂ analyzer or which might react with either NO, O₃, or NO₂ in the gas phase titration.</i>
Recommendation to Address Finding:
Document the quality of zero air when maintenance is performed on the zero air scrubbers and on a periodic basis.

Finding #	FO14
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field

Finding:
Span and precision gases used in the field are not being calibrated routinely.
Description:
In order to reduce the number of gaseous standards that are recertified, AQSB has not had the field standards used for span and precision checks of CO, NO ₂ , and SO ₂ certified routinely. EPA regulations require that standards used to perform the required QC checks every two weeks must be certified. AQSB continued to use certified gases for routine instrument calibrations.
References:
QA Handbook Volume II 40 CFR Part 50, Appendix F 1.3.1 NO concentration standard. Gas cylinder standard containing 50 to 100 ppm NO in N ₂ with less than 1 ppm NO ₂ . This standard must be traceable to a National Bureau of Standards (NBS) NO in N ₂ Standard Reference Material (SRM 1683 or SRM 1684), an NBS NO ₂ Standard Reference Material (SRM 1629), or an NBS/EPA-approved commercially available Certified Reference Material (CRM). 40 CFR Part 58, Appendix A 3.2.1 One-Point Quality Control Check for SO ₂ , NO ₂ , O ₃ , and CO. . . . The standards from which check concentrations are obtained must meet the specifications of section 2.6 of this appendix. 2.6.1 Gaseous pollutant concentration standards (permeation devices or cylinders of compressed gas) used to obtain test concentrations for carbon monoxide (CO), sulfur dioxide (SO ₂), nitrogen oxide (NO), and nitrogen dioxide (NO ₂) must be traceable to either a National Institute of Standards and Technology (NIST) Traceable Reference Material (NTRM) or a NIST-certified Gas Manufacturer's Internal Standard (GMIS), certified in accordance with one of the procedures given in reference 4 of this appendix. Vendors advertising certification with the procedures provided in reference 4 of this appendix and distributing gasses as "EPA Protocol Gas" must participate in the EPA Protocol Gas Verification Program or not use "EPA" in any form of advertising.
Recommendation to Address Finding:
Certify all field gases used to perform QC checks.

Finding #	FO15 QA#
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations QA Management

Comment [A47]: We think this refers to the Calibration Laboratory; therefore, it belongs as a QA finding

Finding:
Mass flow elements (MFEs) are used to establish calibration points outside of their calibrated range.
Description:
The factory calibration range for the MFE for the BGI Tetracal devices goes down to 1.8 standard liters per minute (slm). However, the lowest calibration point used in this calibration is 0.2 slm. While this is significantly below the calibrated range, the MFE's linear range should extend well below this flow rate. The MFE should be calibrated below 0.2 slm so that stability of the standard is objectively measured across its linear range.
References:
NIST Handbook 150-2G, <i>National Voluntary Laboratory Accreditation Program, Calibration Laboratories, Technical Guide for Mechanical Measurements</i> , Section 2.6
<i>2.6.5.3 A laboratory that certifies artifacts to tolerances should demonstrate a measurement uncertainty which does not exceed 50% of the tolerance. Exceptions to this ratio will be accepted for measurement systems which are documented to be state-of-the-art.</i>
NELAC Standard 2003 (Quality Systems Section)
5.5.5.2.2.1 Initial Instrument Calibration
The following items are essential elements of initial instrument calibration:
f) The lowest calibration standard shall be the lowest concentration for which quantitative data are to be reported (see Appendix C.) Any data reported below the lower limit of quantitation should be considered to have an increased quantitative uncertainty and shall be reported using defined qualifiers or flags or explained in the case narrative.
g) The highest calibration standard shall be the highest concentration for which quantitative data are to be reported (see Appendix C.) Any data reported above this highest standard should be considered to have an increased quantitative uncertainty and shall be reported using defined qualifiers or flags or explained in the case narrative.
Recommendation to Address Finding:
The flow calibration laboratory should adjust the MFEs calibration range to be below the lowest flow ranges expected.

Finding #	FO17
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations – Instrument Testing, Certification, and Repair

Finding:
Instruments replaced on the field are not always efficiently tracked and returned to the repair laboratory facility for diagnosis, repair, and reuse. This can result in loss of data due to unavailability of spare instruments (e.g. Sutter Buttes summer 2011).
Description:
<p>The current instrument tracking/information system that CARB maintains is split between at least three different components: 1) an electronic database intended to keep basic tracking information for all of the agency's supplies and equipment, 2) a hard copy Parts and Supplies binder kept in the MLD Stockroom that at the time of the audit displaying a last revision date of August 2009, and 3) an instrument filing cabinet kept in the MLD instrument laboratory, with the intention that each instrument have its own individual folder with detailed information about acceptance tests, repairs, and other relevant history. It is likely that all of these sources together contain most of the useful and necessary information needed to accompany an instrument. The problem is that it may become difficult to find and correlate information from three different systems. A better approach would be to combine all three into one centralized system specific to monitoring equipment.</p> <p>In addition, the operations support manager stated that replaced instruments are sometimes left at sites and may go unnoticed until there is a shortfall in the laboratory. In such cases, the approach used to track down these missing instruments can be rather tedious, as it may involve calling multiple sites before figuring out where the orphaned instrument is. This indicates that the instrument tracking system maintained by the agency is not efficient and has the potential to impact data completeness. EPA found an instance affecting data completeness at the Sutter Buttes site during the summer of 2011 when a malfunctioning O₃ instrument was not promptly replaced due to the lack of a spare. CARB should develop a system that tracks instruments that have not been returned, so that they are diagnosed, and repaired promptly to be available for reuse.</p>
References:
Quality Assurance Handbook for Air Pollution Measurement Systems Volume II: Ambient Air Quality Monitoring Program (December 2008), Sections 11 & 13.
Recommendation to Address Finding:
Establish and implement a robust and centralized monitoring equipment tracking system that allows for prompt and accurate tracking containing all relevant information (i.e. repairs, calibrations, etc.) of instruments. Given long distances between locations in the state and associated shipping costs and time, CARB may choose to explore the establishment of a second instrument laboratory facility to serve the Southern California region.

Finding #	FO18
Agency:	ARB
Date of Audit:	2011
Program Area:	Field Operations

Positive Finding:
CARB is working to improve communication with field staff.
Description:
CARB's monitoring field operations manager is instituting quarterly meetings with all field staff in order to improve communications. EPA supports this as a way to improve consistency and coordination between the field staff across California.
References:
Recommendation to Address Finding:
N/A

Finding #	FO18
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Field Operations – Instrument Testing, Certification, and Repair

Finding:
CARB maintains a well equipped stockroom of spare parts, maintains a large equipment purchase order history, and develops thorough equipment testing procedures that are regularly updated.
Description:
<p>CARB maintains a stockroom within the MLD facilities that is well equipped with all types of replacement parts and spares. This usually allows for timely preventive care and operation of the monitoring network.</p> <p>Upon EPA's request during the audit, CARB was able to provide most of the documentation for large equipment purchases including: bidding specifications based on EPA regulations, purchase receipts and condition reports, contract manufacturer service agreements, and procedures/conditions for the release of funds to the manufacturer.</p> <p>CARB develops extensive procedures to test all newly acquired instruments. Several of these Acceptance Test Procedures (ATP) were examined during the audit. EPA found that CARB develops these forms specific to each instrument model. The ATP forms contain detailed procedures and specifications that shop technicians should check when instruments are first received. The ATP forms allow for review and approval by the Operations Support Manager, as well as the Air Quality Surveillance Branch Chief.</p>
References:
Quality Assurance Handbook for Air Pollution Measurement Systems Volume II: Ambient Air Quality Monitoring Program (December 2008), Sections 11.
Recommendation to Address Finding:
N/A

Finding #	DM1
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Data Management

Finding:
The data validation and review/verification procedures for CARB, including AQSB, NLB, and AQAS are not formally published in a control-copied SOP.
Description:
SOPs detail the work procedures that are to be conducted or followed within an organization. SOPs document the way activities are to be performed to ensure consistent conformance to technical and quality system requirements and to support data quality. SOPs are intended to be specific to the organization or facility whose activities are described and assist that organization to maintain their quality control and quality assurance processes and ensure compliance with governmental regulations. Well-written SOPs can also serve as training materials and as references for staff, particularly if they are updated regularly (the recommendation is every three years). SOPs should be distributed in a manner that ensures that only the most recent versions are used and that historical SOP revisions are retained (these are sometimes called "controlled-copies"). SOPs should also be developed to enable individuals to transition into new positions. Deviations and changes from SOPs should be dated, documented, and kept in a bound or electronic document routinely accessed by and accessible to all staff.
References:
40CFR Part 58 Appendix A Section 3.1.1 states that <i>"Each primary quality assurance organization shall be defined such that measurement uncertainty among all stations in the organization can be expected to be reasonably homogeneous, as a result of common factors. Common factors...include use of a common QAPP or standard operating procedures"</i> . Guidance for Preparing Standard Operating Procedures", EPA/240/B-01/004, March 2001
Recommendation to Address Finding:
Finalize control-copied SOPs for the data validation and review/verification procedures in the AQSB.

Finding #	DM2
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Data Management

Finding:
[Previous Finding M7] Data within the CARB PQAO are not validated using consistent procedures. (See Findings SJV9, IMP10, and MEN11)
Description:
<p>In order to maintain a consistent data set, a PQAO should have a standard for routine data validation. However, the CARB QA Manual does not dictate a specific validation scheme for each of the criteria pollutants. This results in data validation that is inconsistent and has the appearance of being arbitrary. This is of special concern when data are used for NAAQS determination.</p> <p>Further, it is unclear to agencies within the CARB PQAO what the roles and responsibilities are for data validation and submittal. For example, two of the local districts that EPA visited have CARB/AQAS upload continuous data for them. These two local districts expected CARB to validate their data as part of this process. CARB /AQAS does not validate data for any agency. This misunderstanding has resulted in un-validated and sometimes erroneous data being entered into AQAS.</p>
References:
Recommendation to Address Finding:
EPA recommends data validation training for all agencies within the CARB PQAO, including CARB. CARB and local districts should establish SOPs for data validation. CARB and local agencies should establish formal documentation that outlines roles and responsibilities for data review and submittal.

Finding #	DM3
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Data Management

Finding:
[Previous Finding DM5] The CARB Air Quality Analysis Section (AQAS) does not ensure that local district data are validated prior to upload to AQS.
Description:
CARB/AQAS uploads continuous data for ten local districts. There is no formal documentation that guides roles and responsibilities for ensuring that appropriate data validation and submittal procedures are followed by the local district and CARB. EPA identified several local districts that are not validating data prior to submittal to CARB/AQAS for upload. Those local districts that do validate their data are not following any consistent approach.
References:
Recommendation to Address Finding:
CARB should ensure that all local districts having the responsibility for submitting data directly to AQS follow consistent procedures for reviewing and validating data before it is submitted to AQS. EPA recommends establishing formal documentation to define roles and responsibilities for data review and submittal between CARB and each local district within the CARB PQAO.

Comment [A48]: (Factual correction: PTSD does have a SOP, dated 2009, for Ambient Air Quality Data Management, for ARB staff that upload district data into AQS).

Finding #	DM4
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Data Management

Finding:
A few instances of erroneous continuous data were identified in AQS for CARB sites.
Description:
CARB's AQSB validates continuous data for CARB sites, which involves reviewing >50,000 data points per month. The first level of review is done by the station operators for each site; however, this is done inconsistently (see Finding FO8). There is only one staff dedicated to the second level of review for continuous data for CARB sites. The next two levels of review are management reviews of data summaries.
EPA's data review identified missing data that should not have been invalidated and incorrect data that were not identified and corrected. The erroneous data were not identified by any level of review.
References:
Recommendation to Address Finding:
CARB should organize data validation training and finalize SOPs to establish appropriate procedures for data validation (see previous findings on data validation). EPA further recommends dedicating additional tools and/or resources to data validation. For example, developing data visualization tools to assist in reviewing large sets of data may make the review of CARB continuous data more efficient and effective. Finally, data audits by an independent section of CARB (e.g., Quality Management Branch) would help identify systematic deficiencies with data validation as well as specific data issues. EPA recommends that CARB develop data tools (e.g., flags, figures, tables) to conduct effective and efficient data audits.

Comment [A49]: Numerous staff are involved in the second level review of data

Finding #	DM5
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Data Management

Finding:
Erroneous continuous data were identified in AQS for non-CARB sites within the CARB PQAO.
Description:
Each district within the CARB PQAO is expected to validate its own data; however, this is not done consistently (see Findings IMP10, MEN11, and SJV10). EPA identified incorrect data being collected by local districts and submitted to AQS.
References:
Recommendation to Address Finding:
CARB should organize data validation training and finalize SOPs to establish appropriate procedures for data validation (see Finding DM2). Each local district should either adopt CARB SOPs or develop their own. CARB and each local district should formally agree on consistent data validation procedures. In addition, data audits by an independent section of CARB (e.g., Quality Management Branch) would help identify systematic deficiencies with data validation as well as specific data issues. EPA recommends that CARB develop tools (e.g., flags, figures, tables) to conduct effective and efficient data audits.

Finding #	DM6
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Data Management

Finding:
<p>[Previous Finding DM6] There are numerous deficiencies in the data certification process for the CARB PQAO, including:</p> <ul style="list-style-type: none"> • Not all NAAQS-compliant data within the CARB PQAO are routinely certified. • Data certified by CARB for local districts is not reviewed by CARB and is often not validated. • Data are routinely certified by agencies within the State of California but responsibility has not been formally delegated to any local agencies within the State of California.
Description:
<p>Numerous agencies collect, analyze, and submit regulatory ambient air monitoring data. Often the same agency does not perform all of these activities and so it is not clear what agency should certify data. Ultimate authority for certifying data rests with the State, but can be delegated to local agencies; however, historically the responsibility for certifying data has not had formal delegation. EPA identified cases where regulatory data submitted to AQS had not been certified by any agency (see Table 3). The lack of a formal structure for data certification within the State has resulted in incomplete and inappropriate data certification with the potential to jeopardize regulatory decisions. Further, CARB submits data for ten districts within the CARB PQAO and certifies these data without reviewing or verifying that the district validated the data. As a result, some un-validated, erroneous data have been certified by CARB and submitted to AQS.</p>
References:
<p>40 CFR 58.15 EPA guidance on data certification states: “2. What types of monitoring organizations must certify their data?” State and local government monitoring organizations must certify their data. A state official should certify all data submitted for affected monitors in that state, except where responsibility for compliance with 40 CFR Part 58 requirements has been delegated to a local monitoring agency. Note that even if multiple monitoring organizations are considered to be with a single Primary Quality Assurance Organization, the certification must come from the state level, or from each local agency which has delegated responsibilities for compliance with 40 CFR Part 58.”</p>
Recommendation to Address Finding:
<p>EPA recommends that CARB establish a formal structure for data certification. This includes identification of all data to be certified, identification of responsible parties for certification; and formal delegation to the responsible parties. In addition, CARB and local districts should establish formal roles and responsibilities so that no un-validated data are certified and entered into AQS.</p>

Finding #	DM7
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Data Management

Finding:
Data, including those for design value sites, have been changed after they are certified and not recertified.
Description:
CARB's Air Quality Data Branch <u>continues review of data as part of ongoing higher level analysis</u> often reviews data after certification and requests changes. The data are not recertified.
40 CFR Part 58.15 requires data be certified by May 1 of each year. Since the data are considered certified, official, and not subject to change after submittal of the certification letter, changing data at a later date is a significant concern, as the expectation is that the data will not change and may be used for attainment and decision making purposes. Data verification should take place before upload to AQS, not after, when they have the potential to impact numerous decisions already made by several organizations. Any changes to data that occur subsequent to data certification must be recertified. Uncertified data cannot be used for regulatory decisions.
References:
40 CFR Part 58.15
Recommendation to Address Finding:
All data changes and certification should take place consistent with deadlines established in Part 58.15. If data need to be changed after they are certified, they should be recertified.

Finding #	DM8
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Data Management

Finding:
Some local districts within the CARB PQAO are listed as their own PQAO in AQS.
Description:
The following agencies, which are within the CARB PQAO, are listed as their own PQAOs in AQS:
<ul style="list-style-type: none"> • Great Basin Unified APCD • Mendocino County APCD • San Joaquin Valley APCD • Santa Barbara County APCD • Siskiyou County APCD • Tehama County APCD
In some cases some parameters/sites for the local districts are under the CARB PQAO and other parameters/sites are under their own PQAO.
References:
40 CFR 58, Appendix A, Section 3.1
Recommendation to Address Finding:
CARB should identify the cases where data in AQS from agencies within the CARB PQAO are listed as a different PQAO and work with the districts to have data listed under the CARB PQAO. EPA can change the PQAO designation with approval from the local district and CARB.

Finding #	DM9
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Data Management

Finding:
There were several instances of CARB altering data collected by local districts without communicating with the district. CARB altered data collected by local districts without communicating with the district.
Description:
CARB/AQAS enters continuous data for ten local districts. Local districts are expected to validate their data and submit them for direct upload to AQS. AQAS runs a routine AQS report that detects outliers. If any outliers are identified, AQAS staff should-must request that the district review the outliers, and revise the data outliers if necessary . It is AQAS policy, as specified in the Data SOP , not to revise local district data without the district's consent .
AQAS uploads continuous data for two of the districts that EPA visited during this TSA. Within the past year, for both districts there were one or two instances where , data had been altered without AQAS communicating with the local district.
References:
Recommendation to Address Finding:
CARB and local districts should establish formal documentation to establish roles and responsibilities for data review and submittal. CARB/AQAS should follow its policy to have each local agency revise its own data.

Finding #	QA1
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	QA Management

Finding:
The QA Audit group has made an effort to improve its documentation process, however several inconsistencies were noted.
Description:
<p>During the certification process for CARB's National Performance Audit Program, EPA Region noted that the QMB performance audit group should make several improvements to its audit documentation process. These recommendations have been partially implemented through improvements to field documentation and logbooks.</p> <p>Several discrepancies were noted:</p> <ul style="list-style-type: none"> • The audit trailer logbook entries are incomplete and written in pencil. • There is no indication that the trailer logbook was recently reviewed by management. • The equipment maintenance records were not current. • Field sheets are filled out in pencil and transferred to electronic documents. As these sheets may be maintained as official records for the data validator they should be completed in indelible ink. <p>In order to ensure the data produced by the ambient air monitoring network can withstand legal challenges, documentation must be complete, definitive and sufficient to be used as evidence for CARB/EPA designation decisions.</p>
References:
<p>QA Handbook, Volume II, Chapter 5</p> <p>EPA's APTI Course 444, Air Pollution Enforcement Student Manual, Chapter 8</p> <p>Evidence and documentation are not necessarily the same thing. Evidence is used to establish the truth for an issue being contested in court or a formal hearing. Good documentation may become evidence or support evidence. Bad documentation will only raise more questions and often causes the truth to be lost.</p>
Recommendation to Address Finding:
The performance audit group should continue improving its documentation procedures.

Finding #	QA2
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	QA Management

Finding:
The audit trailer evaluated was using one expired gas cylinder and others that had not been certified annually as required for the EPA National Performance Audit Program (NPAP).
Description:
Of the gas cylinders being used in the audit van, only the high concentration multi-blend gas had been certified within the last year. The low concentration CO cylinder had not been certified in over three years and was presumably past its certification period.
The NPAP program states that gasses should be certified annually. Because the CARB audit program performs NPAP audits this criterion must be met.
References:
NPAP Field SOP 4/7/11
3.1.7.4 Annual Gas Cylinder Certification
NPAP mobile audit laboratory compressed gas standards should be certified annually using the EPA Calibration Gas Traceability Protocol. This could be done through CARB's Standards Laboratory , any of the gas vendors, EPA Region 2, 7 or OAQPS support contractor.
Recommendation to Address Finding:
Certify gases used for audits at least annually.

Finding #	QA3
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	QA Management

Finding:
The QA Section is not tracking to ensure that 25% of monitors are being audited per calendar quarter.
Description:
EPA regulation requires that at least 25% of SLAMS monitors are audited each calendar quarter and that every monitor is evaluated at least once per year. The QAS has been meeting this schedule by distributing site audits throughout the year. It is recommended that the evaluations be tracked by dividing the number of monitors audited each quarter by the total monitors in the network. While there is no requirement to schedule evaluations tracking each of the four gaseous criteria pollutants, it is recommended that this be a secondary goal of the program.
References:
<p>40 CFR Part 58, Appendix A</p> <p>“3.2.2 Annual performance evaluation for SO₂, NO₂, O₃, or CO. Each calendar quarter (during which analyzers are operated), evaluate at least 25 percent of the SLAMS analyzers that monitor for SO₂, NO₂, O₃, or CO such that each analyzer is evaluated at least once per year. If there are fewer than four analyzers for a pollutant within a primary quality assurance organization, it is suggested to randomly evaluate one or more analyzers so that at least one analyzer for that pollutant is evaluated each calendar quarter. The evaluation should be conducted by a trained experienced technician other than the routine site operator.”</p>
Recommendation to Address Finding:
Evaluate the current systems as to compliance with the requirement to audit 25% of monitors per quarter.

Finding #	QA4
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	QA Management

Finding:

The connection to the inlet on the audit trailer could pull in outdoor air.

Description:

The probe connection being used by Quality Assurance Section might be creating a Venturi effect, bringing in outdoor air. When the diameter or size of a tube or pipe is increased there is a resulting pressure drop that can overcome the inherent pressure differential and cause a Venturi effect that may overcome excess system pressure.

By reconfiguring the design of the inlet attachment, the possibility of bringing in outdoor air can be significantly reduced. Note that excess flow from the vent should always be verified.



Comment [A50]: QAS routinely checks for bypass at the vent (with wet finger). The audit gas line is well past the vent and delivering over 13 L of air to the station. Unlikely that station is drawing ambient air. QAS has begun to use a rotameter to verify bypass is at least 1 L. SOP is being updated.

References:

Recommendation to Address Finding:

Reconfigure the inlet hardware to reduce the possibility of Venturi pumping and verify excess flow before and after each audit.

Finding #	QA5
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	QA Management

Finding:
Auditors do not review all applicable siting information in AQS prior to an audit.
Description:
It was found that the GPS coordinates for the site where the audit program was reviewed were incorrect in AQS. The QAS was unaware of this discrepancy as they had not evaluated the accuracy of the AQS siting information. Because AQS is the repository of “official” information on each monitoring site and the information is used by EPA to make regulatory decisions and in research studies, it should be periodically verified.
References:
40 CFR Part 58
§ 58.16 Data submittal and archiving requirements.
(a) The State, or where appropriate, local agency, shall report to the Administrator, via AQS all ambient air quality data and associated quality assurance data for SO₂; CO; O₃; NO₂; NO; NO_y; NO_x; Pb–TSP mass concentration; Pb–PM₁₀mass concentration; PM₁₀mass concentration; PM_{2.5}mass concentration; for filter-based PM_{2.5}FRM/FEM the field blank mass, sampler-generated average daily temperature, and sampler-generated average daily pressure; chemically speciated PM_{2.5}mass concentration data; PM_{10–2.5}mass concentration; chemically speciated PM_{10–2.5}mass concentration data; meteorological data from NCore and PAMS sites; average daily temperature and average daily pressure for Pb sites if not already reported from sampler generated records; and metadata records and information specified by the AQS Data Coding Manual (http://www.epa.gov/ttn/airs/airsaqs/manuals/manuals.htm).
Recommendation to Address Finding:
Auditors should verify that site information in AQS is correct.

Finding #	QA6
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	QA Management

Finding:
[Previous Findings M4 & OPA2] Quality assurance for special projects is not developed in a process consistent with EPA quality system requirements.
Description:
<p>When EPA grant funds are used by CARB to collect environmental data, or when data are used to support an EPA regulatory decision, data collection and use must be covered by a quality system that meets EPA requirements.</p> <p>MLD does not have oversight authority for monitoring projects that are conducted entirely or initiated by other CARB Divisions or California Air Districts. The quality assurance planning and implementation for these projects is generally not transparent to MLD or EPA.</p> <p>AQSB does implement quality assurance planning for special projects where MLD plays a significant role. These projects may or may not include planning and implementation review by the QMB.</p>
References:
<p>40 CFR Parts 31 and 35</p> <p>Grant recipients are required to document their quality systems.</p> <p>CIO 2105.0 (formerly 5360.1 A2)</p> <p>Approval Date: May 5, 2000</p> <p>5. <u>SCOPE AND FIELD OF APPLICATION.</u></p> <p>a. <u>Scope.</u> This Order defines the minimum requirements for quality systems supporting EPA environmental programs that encompass:</p> <p>(1) the collection, evaluation, and use of environmental data by or for EPA, and</p> <p>(2) the design, construction, and operation of environmental technology by EPA.</p> <p>b. <u>Applicability to Environmental Programs.</u> This Order applies to (but is not limited to) the following environmental programs:</p> <p>(1) the characterization of environmental or ecological systems and the health of human populations;</p>

(2) the direct measurement of environmental conditions or releases, including sample collection, analysis, evaluation, and reporting of environmental data;

(3) the use of environmental data collected for other purposes or from other sources (also termed “secondary data”), including literature, industry surveys, compilations from computerized data bases and information systems, results from computerized or mathematical models of environmental processes and conditions; and

(4) the collection and use of environmental data pertaining to the occupational health and safety of personnel in EPA facilities (e.g., indoor air quality measurements) and in the field (e.g., chemical dosimetry, radiation dosimetry).

Recommendation to Address Finding:

Develop a process in the QMP to ensure that special projects collect monitoring data suitable for their intended use and include independent quality assurance planning, implementation and assessment support. Work with other CARB divisions to promote good quality assurance practices for all data collection activities.

Finding #	PM1
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	PM Laboratory

Finding:
Communication of post-weigh information and transmission of documentation to local districts could be improved.
Description:
The PM Laboratory supports filter weighing operations for a number of districts throughout California. Some agencies have indicated that post-weigh PM data has not always been transmitted in a timely fashion. There is an inherent necessity in timely communication of PM data with local districts, especially when there are exceedances of the standard.
References:
Recommendation to Address Finding:
Formalize communication procedures in order to maintain timely transmission of post-weigh PM data that is consistent with the expectations and needs of the local districts.

Finding #	PM2
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	PM Laboratory

Finding:
The PM Laboratory does not have a formal corrective action process for addressing issues with PM filter collection.
Description:
Currently, the existing corrective action process for CARB is limited to the QMB performance audit program and Standards Laboratory calibration services . A similar process should be applied to the PM Laboratory. The PM Laboratory supports filter weighing operations for a number of districts throughout California and often receives filters that have been damaged or deemed invalid due to other operational issues (i.e. filters received after required weighing period). Currently, these issues are communicated informally via email or phone call conversations. Due to the recurring nature of these issues, which result in data loss, the PM Laboratory should have a mechanism to minimize these losses through a corrective action process.
References:
EPA quality management standards (EPA QA/R-2, Quality Improvement Section) require that management and staff “ <i>ensure that conditions adverse to quality are” prevented, identified promptly, fully defined, corrected, prevented from recurring, and documented as corrective actions which are tracked to closure.</i> ”
Recommendation to Address Finding:
Establish a formal corrective action process for the PM Laboratory.

Finding #	PM3
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	PM Laboratory

Finding:
Documentation of activities in the PM ₁₀ and PM _{2.5} Laboratories could be improved.
Description:
<p>Although the majority of activities in the PM Laboratory are adequately tracked and documented, there are some areas where improvements could be made. Specific examples include:</p> <ul style="list-style-type: none"> • The PM₁₀ Laboratory does not maintain a general laboratory logbook. • Expiration and replacement of electrostatic strips are not documented. • Post-weigh conditioning times are noted on post-its and not formally documented. • Honeywell charts are primary records that are accompanied by a digital Dickson logger, but RH/Temp are not transferred or tracked in LIMS. • Post-its are placed on archived Honeywell charts when RH/Temp goes out of spec and is not formally documented. • Temperature of refrigerator used for cold storage of filters is not documented. • Removal of filters from cold storage is not documented.
References:
Recommendation to Address Finding:
Implement or improve documentation of identified activities.

Finding #	PM4
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	PM Laboratory

Finding:
PM ₁₀ trip blanks are not being used to assess potential bias from filter transport and handling.
Description:
Trip blanks controls are useful in assessing potential contamination of filters from transport and laboratory handling.
References:
Table 10.1 in Section 10.2: Internal vs. External Quality Control of the <i>QA Handbook for Air Pollution Measurement Systems, Volume II</i> , EPA-454/b-08-002, December 2008 identifies trip blanks as a method for assessing bias due to contamination or operator error.
Recommendation to Address Finding:
Collect periodic PM ₁₀ trip blanks.

Finding #	TL1
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Canister Cleaning

Finding:
The canister cleaning SOP does not reflect the current cleaning procedure in use, including the number of cleaning cycles for a newly acquired cleaning system, where the number of cycles has been reduced from nine, as stated in the SOP, to five.
Description:
Staff stated the SOP is being re-written. SOPs document an agency's official policies and procedures to which staff should adhere to obtain consistent and reliable data. They are required as part of an agency's approved QAPP. SOPs are used in training analysts in agency accepted analytical methodology and help demonstrate data defensibility.
References:
40 CFR Part 58, Appendix A
Recommendation to Address Finding:
CARB should update SOPs to reflect current practice to be compliant with 40 CFR Part 58, Appendix A. It is recommended that SOPs be reviewed annually at a minimum and updated as needed. It is further suggested that analysts initial the SOPs to indicate that they have read and understand the SOP and have had an opportunity to discuss them with their supervisor.

Finding #	TL2
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Canister Cleaning

Finding:
An SOP is not documented for the batch certification of cleaned canisters. The canister cleaning SOP lists cleaning criteria for the MLD 058 method, but not for the MLD 066 method.
Description:
CARB staff stated that current criteria are documented in the Quality Assurance Manual (QAM), but not the SOP. It is unclear why there are different cleaning criteria the two methods. Refer to previous finding.
References:
40 CFR 58, Appendix A
Recommendation to Address Finding:
Consistency across methods would facilitate the use of the QAM as a reference. Analysts' initials on SOPs would document that they understand approved current procedures.

Finding #	TL3
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Canister Cleaning

Finding:
The batch certification of cleaned canisters described by staff for methods MLD 058 and MLD 066 differs from existing VOC guidance in that one cleaned canister of twelve is tested for residual contamination as part of the certification process.
Description:
PAMS guidance recommends that one cleaned canister out of eight be certified and Method TO-15, on which these methods are based, recommends certifying every canister.
Batch certification can identify excessively dirty canisters or a malfunction of the cleaning system during the cleaning cycle, but may be inadequate to certify that every canister in a batch is actually clean. Analyzing one out of twelve instead of eight canisters introduces even greater uncertainty. The uncertainty increases if the dirtiest canister in a batch is not selected as the certification canister.
References:
PAMS TAD, Method TO-15.
Recommendation to Address Finding:
CARB should either certify more of the canisters in each cleaning batch in accordance with current VOC method guidance for these modified methods or conduct studies to demonstrate the batch certification process is effective for the specific contaminants in these methods by analyzing every canister in a batch for a period of time. Confidence that the current practice is adequate would be increased if the number of canisters that failed certification is maintained in a log. Developing a trend chart of the level of contamination detected during canister certification may also serve to alert staff that cleaning equipment maintenance is needed.

Finding #	TL4
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Canister Cleaning

Finding:
[Related to Previous Finding OL19]. Pre-cleaning concentrations are not recorded in a logbook to allow for the selection of the most highly contaminated canister for batch certification.
Description:
Canisters are randomly selected for certification. However, as a result of the previous TSA, CARB has initiated a system of marking canisters that have been selected for testing as part of the batch certification to ensure that eventually all canisters are tested.
Certifying the canister with the most highly contaminated sample concentrations during batch certification in accordance with guidance would provide a higher level of confidence that the entire batch of canisters has been effectively cleaned.
References:
PAMS TAD, Sec. 2.5.2.3
Recommendation to Address Finding:
CARB should select the most highly contaminated canisters cleaned in a batch for analysis to certify that the batch is free of contamination.

Finding #	TL5
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Canister Cleaning

Finding:
Canisters are not routinely leak tested as prescribed in guidance. Instead, canisters are vacuum leak tested only when gross leaks are suspected.
Description:
Canisters can become contaminated over time from leaks and micro leaks, which are not obvious from monitoring canister gauge readings. Method TO-15, on which methods MLD 066 and MLD 058 are based, describes the process for leak testing canisters in Sec. 8.4.1.1 and establishes a criterion of ± 2 psig, beyond which the pressure may not vary. Canisters may also become contaminated over time through micro leaks. The PAMS TAD, Section 2.5.3.6, states that "...obvious leaks may be checked by submerging canisters in water, but to check for micro leaks, the canister should be evacuated and its pressure observed for several days with a sensitive absolute pressure gauge connected."
References:
Method TO-15, Sec. 8.4.1.1; PAMS TAD, Sec. 2.5.3.6
Recommendation to Address Finding:
CARB should establish a program of monitoring for leaks and micro leaks as prescribed in Method TO-15 and the PAMS TAD.

Finding #	TL6
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Canister Cleaning

Finding:
[Previous Finding OL21]. A retention time policy for re-cleaning and blanking canisters once they have been certified clean has not been established. The Canister Custodian confirmed that she observes reappearance of contamination in cleaned canisters over time.
Description:
Canisters may become contaminated over time through small leaks or micro leaks that may not be obvious from monitoring canister gauge readings (see Description, Finding 5). Additionally, PAMS TAD, Section 2.5.3.2 states that "... canisters may appear uncontaminated immediately after cleaning, but will out-gas contaminants upon storage for several weeks. All canisters in use should be blanked checked frequently and particularly after extended periods of storage, to ensure that significant contamination does not appear." EPA observed probable out-gassed contaminants from canister surfaces in a recent PAMS PE Study of Air District laboratories conducted by the Region 9 QA Office.
References:
PAMS TAD, Section 2.5.3.6
Recommendation to Address Finding:
CARB should establish a retention time for cleaned and certified canisters after which they must be re-cleaned and certified. A retention time of 30 days has been adopted by the EPA Region 9 Laboratory and other laboratories.

Finding #	TL7
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Canister Cleaning

Finding:
The CARB SOP states that old canisters are reconditioned, but is inconsistent with practice.
Description:
Staff stated that the reconditioning procedure was determined to be ineffective and has been discontinued. Similar information was presented at the 2011 Air Conference in Dallas, Texas.
The CARB SOP regarding reconditioning of canisters should be revised or deleted, since the SOP does not reflect current practice and a procedure for reconditioning based on best available information does not currently exist.
References:
40 CFR Part 58, Appendix A
Recommendation to Address Finding:
The CARB SOP relating to reconditioning of canisters should be revised or deleted, since the SOP does not reflect current practice or recommended procedure. CARB may wish to implement a procedure in its place for evaluating old canisters for replacement, as it has been observed that coatings on older canisters are more subject to retaining and out-gassing residual contaminants over time.

Finding #	TL8
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Carbonyls

Finding:
CARB has not established a holding time for cartridges once samples have been collected for extraction or analysis.
Description:
<p>Cartridges are kept for a couple of weeks in the field before shipping them to the laboratory. Staff also stated that cartridges are generally analyzed within the four weeks recommended by the cartridge vendor (Waters), but not within 14 days as specified in Method TO-11 or 30 days following extraction specified in the method.</p> <p>Exceeding method prescribed holding times can result in data being qualified due to potential loss of sample or a risk of contamination from extraneous sources, even under refrigeration. Exceeding prescribed method holding times can result in data that are more vulnerable to challenge.</p>
References:
Method TO-11
Recommendation to Address Finding:
CARB should establish a policy for holding time based on the TO-11 method holding time (preferred) or, if necessary, conduct and document internal research demonstrating that a variance from the published holding time is justified.

Finding #	TL9
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Carbonyls

Finding:
The laboratory does not assign expiration dates to new sampling cartridges and allows cartridges to be used beyond the 90 days prescribed by the method.
Description:
Method TO-11 states in its discussion of the preparation of DNPH cartridges <i>“that cartridges will maintain their integrity for up to 90 days stored in refrigerated, capped shipping tubes”</i> (TO-11 note, sec. 9.5.2.16). Initial blank lot concentrations are provided with commercially purchased cartridges. Given the significant concern expressed throughout Method TO-11 over potential laboratory contamination, it is prudent to be alert to potential contamination during storage. One of the air districts assigns a six month expiration date to cartridges. A commercial laboratory (AAC Laboratory, Ventura, CA) confirmed that it routinely monitors and observes that blank concentrations increase over time, although not past criteria levels. The level of contamination will depend on how the cartridges are stored and if they become exposed to contaminants. Therefore, unused cartridge lots are probably best recertified for QA documentation purposes after 90 days, as suggested by guidance.
References:
Method TO-11, Note in sec. 9.5.2.16
Recommendation to Address Finding:
As recommended in Method TO-11 and confirmed by laboratory experience, it should be verified that cartridges meet blank certification requirements by analyzing a blank cartridge before using them past the 90-day PAMS season.

Finding #	TL10
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Carbonyls

Finding:
CARB's procedure for analyzing DNPH lot blanks differs from the SOP.
Description:
The SOP states that 5% of new DNPH cartridges will be analyzed as lot blanks. Staff stated the practice has been changed to one cartridge per lot rather than one per box.
The SOP should be updated to reflect current practice. SOPs document an agency's official policies and procedures that staff are to adhere to obtain consistent and reliable data and are required as part of an agency's approved QAPP as required by 40 CFR 58 Appendix A.
References:
40 CFR Part 58, Appendix A
Recommendation to Address Finding:
CARB should update the SOP to reflect current practice.

Finding #	TL11
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Carbonyls

Finding:
No criterion is provided in the CARB SOP for passing DNPH lot cartridge blanks.
Description:
Carbonyl Method TO-11 prescribes acceptance criteria for lot blanks of less than 0.15 µg/cartridge (formaldehyde) and less than 0.10 µg/cartridge (acetaldehyde). The SOP should be consistent with practice. Furthermore, the criterion used by CARB of 2X RL is not appropriate. The RL must be higher than the blank contamination.
References:
Method TO-11, sec. 5.8
Recommendation to Address Finding:
CARB should establish acceptable acceptance criteria for cartridge blanks consistent with the method prescribed criteria and the SOP that does not reflect current practice should be updated.

Finding #	TL12
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Carbonyls

Finding:
Gloves are not worn as a contamination protection measure when handling cartridges. A nitrogen-purged glove bag is not used for extractions.
Description:
Method TO-11 cautions against the unintentional contamination of eluted samples due to aldehyde and ketone contamination in laboratory air, inks, adhesives, packaging, and vials with plastic caps. The use of gloves is prescribed when handling the cartridges. Extracting the cartridges in a nitrogen-purged glove further reduces the risk of contamination. Food and drink residue on hands can also present a contamination problem in addition to safety issues related working with acetonitrile without proper protection. The use of a glove box will vary with the laboratory air environment; working in a very clean hood may be sufficient.
References:
Method TO-11, Sec. 10.7, 11.2
Recommendation to Address Finding:
CARB should evaluate its current procedures to ensure that current contamination control measures are adequate.

Finding #	TL13
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Carbonyls

Finding:
[Previous Finding OL3] Staff stated that field blanks are not being analyzed at a frequency of 10% of field samples, as specified in Method TO-11, nor is there an SOP describing the procedure for the submission of field blanks.
Description:
During the previous TSA, staff stated that CARB was correcting sample results based on an average of field blank results from a study performed 15 years prior. The study was outdated and sample results should not be corrected. During the current TSA, staff stated that sample results are no longer being subtracted, but that field blanks are not being collected as prescribed in the method. Field blanks increase the level of confidence that sample contamination detected is not from extraneous sources.
References:
Method TO-11, Sec. 13.3.1 Table 5-3
Recommendation to Address Finding:
CARB should use field blanks at the method prescribed frequency of 10% of field samples collected; a minimum of one field blank per sample collection batch is recommended. Data for field blanks and sample results should be reported separately.

Finding #	TL14
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Carbonyls

Finding:
CARB does not analyze trip blanks.
Description:
Method TO-11 states that it is desirable to collect trip blanks at a frequency of 10% of field samples. In addition to field blanks and laboratory blanks, trip blanks should be collected and analyzed to distinguish between sources of contamination.
References:
Method TO-11, Sec. 13.3.1 & Table 5-3
Recommendation to Address Finding:
CARB should review its policy for blanks and consider the value of collecting and analyzing trip blanks in addition to laboratory and field blanks.

Finding #	TL15
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Carbonyls

Finding:
Method TO-11 states that samples should be re-analyzed when results are 10 % above the criterion, but the analyst was not aware of this criterion.
Description:
Up-to-date SOPs help train analysts new to accepted laboratory procedures. Having analysts initial SOPs annually to indicate that they have read the SOPs and have had an opportunity to discuss them with their supervisor is also valuable. Some laboratories administer a written test to qualify an analyst to perform a new method. Keeping charts of the duplicate results with control lines indicating the criterion can ensure that laboratory QC criteria are given adequate attention at the time of analysis.
References:
Method TO-11, Sec. 13.4.1 & Table 5-3, MLD 022 Sec. 9.6
Recommendation to Address Finding:
CARB should review the system of qualifying analysts to perform methods new to them and should implement procedures to ensure they are knowledgeable concerning all required QC.

Finding #	TL16
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Carbonyls

Finding:
Working standards are tracked and used for six months, differing from the CARB SOP, which states that standards should be retained for four months under refrigeration.
Description:
Periodic reviews by the supervisor of logbooks and internal audits or reviews by a Quality Assurance Officer would help ensure that replacement schedules are kept. Using expired standards can result in inaccurate data and legal challenges.
References:
CARB SOP; Method TO-11; GLP
Recommendation to Address Finding:
CARB should implement a policy to ensure that standards used for instrument calibration are replaced before they exceed holding times.

Finding #	TL17
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Hexavalent Chromium

Finding:
Site name and sampling dates are recorded on a piece of tape loosely stuck to sample cartridges, with labels occasionally falling off, causing difficulty in identifying samples.
Description:
A better system for labeling samples is needed to increase confidence that a data point is appropriately identified with a particular sample.
References:
Recommendation to Address Finding:
CARB should devise a permanent system for labeling cartridges.

Finding #	TL18
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - Hexavalent Chromium

Positive Finding:
Data undergo peer review, supervisory review, review by the Branch Chief, and a final review before going to AIRS.
Description:
Data go through a multi-tiered review process. The data review procedure described represents a best practice.
References:
Recommendation to Address Finding:
N/A

Finding #	TL19
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - MLD058, Aromatic & Halogenated Compounds, VOCs (Modified TO-15)

Finding:
[Previous Finding OL5] There is no secondary review of logbooks.
Description:
Secondary review of logbooks by supervisory or QA staff can help ensure that proper protocol is being followed. .
References:
Recommendation to Address Finding:
Instrument run log books should routinely be reviewed and signed by supervisory or QA staff.

Finding #	TL20
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - MLD058, Aromatic & Halogenated Compounds, VOCs (Modified TO-15)

Finding:
CARB does not analyze audit samples or through the probe audit samples as suggested in Sec. 9.7 of the CARB SOP.
Description:
Staff stated that the SOP to analyze audit samples had been followed in the past, and have requested that this be reinitiated.
References:
CARB SOP, Section 9.7
Recommendation to Address Finding:
CARB is encouraged to use audit samples and through the probe audit samples when possible, as suggested in the CARB SOP, or CARB should revise its SOP to reflect actual practices.

Finding #	TL21
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - MLD 066 Oxygenated Hydrocarbons & Nitriles (Modified TO-15)

Finding:	Appendix V in the CARB SOP lists the standards that were used in 2003 and has not been updated to reflect the standards currently being used.
Description:	Staff stated current standards are found in the QC report. Outdated information in an SOP can lead to misunderstanding in practice and could represent a vulnerability if data are challenged. SOPs must be updated to reflect practice.
References:	40 CFR 58, Appendix A (SOPs)
Recommendation to Address Finding:	SOPs must represent current practices and should be periodically updated in accordance with 40 CFR 58, Appendix A.

Finding #	TL22
Agency:	California Air Resources Board
Date of Audit:	Summer 2011
Program Area:	Toxics Laboratory - MLD 066 Oxygenated Hydrocarbons & Nitriles (Modified TO-15)

Finding:
CARB does not analyze audit samples or through the probe audit samples as suggested in Sec. 9.7 of the CARB SOP.
Description:
Audit samples are an important quality assurance tool to ensure the accuracy of analytical data. Through the probe audits help document that the sample and analysis system are within acceptable control limits.
References:
CARB SOP, Section 9.7
Recommendation to Address Finding:
CARB is encouraged to use audit samples and through the probe audit samples when possible, as suggested in the CARB SOP.

Finding #	IMP1
Agency:	California Air Resources Board - Imperial County APCD
Date of Audit:	Summer 2011
Program Area:	Imperial – General

Finding:
The ICAPCD ambient air monitoring program is not operating under an approved QAPP.
Description:
EPA requires that organizations develop a QAPP for each type of ambient pollutant being measured. The QAPP integrates all technical and quality aspects of a project, including planning, implementation, and assessment. The purpose of the QAPP is to document planning results for environmental data operations and to provide a project-specific “blueprint” for obtaining the type and quality of environmental data needed for a specific decision or use. The QAPP documents the quality assurance and quality control that are applied to an environmental data operation to assure the results obtained are of the type and quality needed and expected.
References:
40 CFR 58 App. A 2.1, Quality Management Plans and Quality Assurance Project Plans, <i>QA Handbook for Air Pollution Measurement Systems, Volume II</i> , EPA-454/b-08-002
Further guidance on developing QAPPs can be found in the guidance documents “ <i>EPA Requirements for Quality Assurance Project Plans</i> ,” EPA/240/B-01/003, March 2001, and “ <i>Guidance for Quality Assurance Project Plans</i> ,” EPA/240/R-02/009, December 2002
Recommendation to Address Finding:
ICAPCD is currently part of the CARB PQAO, which is responsible for maintaining consistency in the collection and assessment of ambient air quality data throughout the state of California so that the data may be combined to give meaningful information.
ICAPCD should develop agency specific QAPPs that are consistent with existing CARB QAPPs or formally adopt the applicable existing CARB QAPPs.

Finding #	IMP2
Agency:	California Air Resources Board - Imperial County APCD
Date of Audit:	Summer 2011
Program Area:	Imperial - General

Finding:
Imperial County APCD has not established an appropriate quality system for ambient air monitoring.
Description:
<p>A quality system is the means by which an organization manages the quality of the monitoring information it produces in a systematic, organized manner. It provides a framework for planning implementing, assessing and reporting work performed by an organization and for carrying out required quality assurance and quality control activities. While the monitoring staff at ICAPCD is very knowledgeable and operates the ambient air monitoring network diligently, the lack of a structured quality system is needed to effectively and appropriately implement ambient air monitoring requirements. Major components of a quality system include:</p> <ul style="list-style-type: none"> • Quality Management Plans (QMP) and Quality Assurance Project Plans (QAPP) • Independence of Quality Assurance • Data Quality Performance Requirements (Data Quality Objectives, DQOs) • Quality Control (QC) and Quality Assurance (QA) Activities
References:
40 CFR 58 App. A 2.0, Quality System Requirements QA Handbook for Air Pollution Measurement Systems, Volume II, EPA-454/b-08-002
Recommendation to Address Finding:
Appropriately implement a quality system consistent with EPA requirements and applicable guidance.

Finding #	IMP3
Agency:	California Air Resources Board - Imperial County APCD
Date of Audit:	Summer 2011
Program Area:	Imperial - Network Management

Finding:
Assessment of PM ₁₀ or PM _{2.5} sampling frequency throughout the Imperial County network has not been performed as required.
Description:
<p>The minimum required monitoring schedules for PM₁₀ in the area of expected maximum concentration should be based on the relative level of that monitoring site concentration with respect to the 24-hour standard as illustrated in Figure 1 of 40 CFR 58.12. The most recent year of data must be considered to estimate the air quality status at the site near the area of maximum concentration no less frequently than as part of each 5-year network assessment.</p> <p>Similarly, the PM_{2.5} sampling schedule for sites where measurements determine the design value for the area that are within $\pm 10\%$ of the NAAQS. All required sites where one or more 24-hour values have exceeded the NAAQS each year for a consecutive period of at least 3 years are required to maintain at least a 1 in 3 day sampling frequency. SLAMS where measurements determine the design value for the area and are within 5 % of the NAAQ must maintain an everyday sample schedule.</p> <p>EPA may not be able to make attainment determinations from site where appropriate sampling frequency is not achieved.</p>
References:
40 CFR 58.12 (e)
40 CFR 58.12 (d)(ii) and (iii)
Recommendation to Address Finding:
CARB and ICAPCD should perform the required analysis to ensure PM ₁₀ and PM _{2.5} monitoring in Imperial County operate at the appropriate sampling frequency. Necessary changes to sampling schedules should be made as expeditiously as possible.

Finding #	IMP4
Agency:	California Air Resources Board - Imperial County APCD
Date of Audit:	Summer 2011
Program Area:	Imperial - Network Management

Finding:
Neighborhood scale may be inappropriate for PM ₁₀ at the Westmorland site.
Description:
<p>The area surrounding the Westmorland monitoring site is mostly residential surrounded by active agricultural fields, but is located on the Westmorland Wastewater Treatment property and may be influenced by local activity and not representative of a neighborhood spatial scale for PM₁₀. The area directly adjacent to the monitoring site is mainly comprised of unpaved areas that are disturbed by vehicle traffic and heavy equipment. Due to similar surface conditions throughout the area, the PM₁₀ monitor is appropriately sited, but may be more appropriately characterized as a having a middle scale of representation.</p> <p>Neighborhood scale defines concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 km range. The neighborhood and urban scales listed below have the potential to overlap in applications that concern secondarily formed or homogeneously distributed air pollutants, while middle scale defines the concentrations typical of areas up to several city blocks in size with dimensions ranging from about 100 m to 0.5 km.</p>
References:
40 CFR App. D 1.2 (b) 40 CFR App. D 4.6 (b)
Recommendation to Address Finding:
ICAPCD should evaluate the spatial scales associated with PM ₁₀ monitoring at Westmorland and make changes to AQS and the next annual network plan, if appropriate.

Finding #	IMP5
Agency:	California Air Resources Board – Imperial County APCD
Date of Audit:	Summer 2011
Program Area:	Imperial - Field Operations

Finding:
One-point flow rate verifications for PM ₁₀ and PM _{2.5} are not performed by ICAPCD as required and are not well documented.
Description:
<p>ICAPCD has not purchased flow rate transfer standards, and therefore the monitoring staff does not perform one-point flow rate verifications as required. Currently, a nearby CARB site operator, responsible for the Calexico Ethel monitoring site, performs all flow rate verifications on an “as needed” basis. Based on the available documentation at the monitoring sites, these checks have been missed in the past and have not been well documented. Many records were outdated or incomplete. Also, flow rate transfer standard certification records are not maintained by ICAPCD. Due to a lack of consistent documentation, it is unclear when flow rate verifications have been performed and whether the flow rate transfer standard used to perform the checks has been certified relative to an authoritative standard as required.</p> <p>A one-point flow rate verification check must be performed at least once every month on each automated analyzer used to measure PM₁₀ and PM_{2.5}. For ICAPCD, these should be performed monthly on the PM₁₀ BAM1020's operating at Niland and Brawley and filter based PM_{2.5} monitors at El Centro. The same issues are present for high-volume PM₁₀ samplers, which are required to have one-point flow rate verifications performed on a quarterly basis.</p>
References:
40 CFR 58 App. A 2.6 40 CFR 58 App. A 3.2.3 40 CFR 58 App. A 3.3.2
Recommendation to Address Finding:
ICAPCD should purchase the appropriate flow rate transfer standards for automated PM ₁₀ analyzers, filter based PM _{2.5} samplers, and high-volume PM ₁₀ samplers and performed flow rate verifications as required by regulation. Also, these activities should be consistently documented by ICAPCD.

Finding #	IMP6
Agency:	California Air Resources Board – Imperial County APCD
Date of Audit:	Summer 2011
Program Area:	Imperial - Field Operations

Finding:
Residence time for gaseous monitors operated by ICAPCD is not established.
Description:
<p>The residence time is defined as the amount of time that it takes for a sample of air to travel from the opening of the cane to the inlet of the instrument. 40 CFR Part 58, Appendix E Section 9 states that for the reactive gases (O₃, NO₂, and SO₂) residence times must be less than 20 seconds. Additionally, it is recommended that the residence time within the manifold and sample lines to the instruments should be less than 10 seconds. The station technicians should calculate the residence time, document it in the station logbook, and periodically verify the data.</p> <p>There was not a clear record of residence time of the sampling lines at each site. Also, the site operators did not know how recently the residence time had been recalculated. At a minimum, the residence time should be calculated for each instrument after any change is made to the sampling train, such as the removal or addition of other instruments, and posted at each site.</p> <p>The station technicians should calculate the residence time, document it in the station logbook or other form available at the site, and periodically verify the data.</p>
References:
40 CFR 58 App. E 9 (c)
Recommendation to Address Finding:
In order limit the potential for significant losses of O ₃ through the sampling line, residence times should be calculated, documented, and tracked. If residence times are higher than those required by regulation, ICAPCD should make the necessary changes to the sampling train to reduce the residence time.

Finding #	IMP7
Agency:	California Air Resources Board – Imperial County APCD
Date of Audit:	Summer 2011
Program Area:	Imperial - Field Operations

Finding:
ICAPCD is internally post weighing high-volume PM ₁₀ filters without proper PM lab or quality control measures.
Description:
Traditionally, all high volume PM ₁₀ filters are process and weighed by CARB in appropriately controlled environments and necessary quality control and quality assurance techniques. ICAPCD stated that often the post-weigh information is not transmitted back to ICAPCD from CARB in a timely manner. As a result, ICAPCD has implemented a preliminary post-weigh procedure for PM ₁₀ high-volume filters in order to get a preliminary assessment of whether the samplers are measuring exceedances of the standard, so that the appropriate planning actions and preparation can occur immediately after the sample has been collected.
These preliminary post-weighing procedures are not performed in a controlled environment nor do they follow the required quality control procedures. Furthermore, the weighing and subsequent handling of these filters prior to the official CARB post-weigh may introduce bias in the sample.
References:
Method 2.12 Sec. 7
Recommendation to Address Finding:
ICAPCD should discontinue the internal post-weighing practices and work with CARB to establish an appropriate procedure for the timely transmittal of CARB post-weigh information to ICAPCD.

Finding #	IMP8
Agency:	California Air Resources Board – Imperial County APCD
Date of Audit:	Summer 2011
Program Area:	Imperial – Field Operations

Finding:
Documentation of ICAPCD air monitoring activities is not complete.
Description:
<p>Accurate and complete documentation is essential to the collection of air quality data used for regulatory purposes. Appropriate documentation includes, but is not limited to, standard operating procedures for all aspects of an organization's program, data quality assessments, logbooks tracking actual day-to-day operations, and records of quality control, quality assurance, and maintenance checks. Oversight of personnel and activities involved in the collection, processing and submittal of data is facilitated by procedures that are standardized and responsible personnel record their compliance with these procedures.</p> <p>Currently, ICAPCD does not have a formal or consistent process for documenting air quality monitoring activities. For example, many records are maintained on loose-leaf paper or post-it notes (instrument maintenance records, PM₁₀ make-up sample dates, PM₁₀ motor repair, and notes on changes made to the data in the database). Many records or entries in logbooks are made in pencil, not initialed, and were limited in information or specificity.</p> <p>In response to a data tracking request, documentation of flow rate verifications and calibrations of PM₁₀ analyzers could not be located, and documentation supporting data invalidation was not present.</p>
References:
QA Handbook for Air Pollution Measurement Systems, Volume II, EPA-454/b-08-002
Recommendation to Address Finding:
ICAPCD should develop and implement procedures for maintaining adequate documentation of ambient air monitoring activities.

Finding #	IMP9
Agency:	California Air Resources Board - Imperial County
Date of Audit:	Summer 2011
Program Area:	Imperial - Network Management

Finding:
There are potential siting issues at the Calexico Ethel site.
Description:
<p><u>Factual addition is needed here—ARB staffs have identified issues with the site and have been working with Region 9 staff and Imperial District staff to relocate the site.</u> The Calexico Ethel monitoring site is located in the parking lot of a high school in a mostly residential area. The primary concern is the distance of the monitoring site to nearby trees. Trees can act as obstructions in cases where they are located between the air pollutant sources or source areas and the monitoring site, and where the trees are of a sufficient height and leaf canopy density to interfere with the normal airflow around the probe, inlet, or monitoring path. The scavenging effect of trees is greater for O₃ than for other criteria pollutants and monitoring agencies must take steps to consider the impact of trees on O₃ monitoring sites</p> <p>To reduce the potential interference/obstruction, the probe, inlet, must be at least 10 m or further from the drip line of trees.</p> <p>Other potential issues include monitor spacing on the roof and the distance of the collocated PM_{2.5} monitors to the trailer. Generally, the distance from the obstacle to the probe, inlet, or monitoring path must be at least twice the height that the obstacle protrudes above the probe or inlet.</p>
References:
40 CFR 58 App. D 4 (a) 40 CFR 58 App. D 5 40 CFR 48 App. A 3.2.6.3
Recommendation to Address Finding:
CARB should evaluate these issues and address them as appropriate to ensure the siting of the Calexico Ethel monitoring site is in compliance with regulation.

Finding #	IMP10
Agency:	California Air Resources Board – Imperial County APCD
Date of Audit:	Summer 2011
Program Area:	Imperial - Data Management

Finding:
ICAPCD is not adequately reviewing and editing data.
Description:
(See Finding DM2)
<p>The current database does not allow staff to adequately review and edit data. ICAPCD uses a WinCollect data management system developed by Ecotech for data acquisition, storage, and processing. Monitoring staff has indicated that the current system is hard to work with, and that data review and editing are cumbersome and time consuming tasks. For example, the data system can only automatically assign one flag (AY: “QC Control Points”) to the raw data. As a result, monitoring staff must manually edit hourly text files to make any adjustments. This process introduces the potential for errors in the data and reduces monitoring staff’s ability to effectively review and edit data appropriately.</p> <p>ICAPCD staff has contacted the Ecotech about these issues, but have a difficult time implementing changes to the system, as Ecotech has been largely unresponsive.</p> <p>ICAPCD would benefit from data validation training.</p>
References:
QA Handbook for Air Pollution Measurement Systems, Volume II, EPA-454/b-08-002
Recommendation to Address Finding:
ICAPCD should work with CARB to implement a more efficient and comprehensive data management system and to obtain data validation training.

Finding #	MEN1
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino – QA Management

Finding:
MCAPCD staff were not familiar with the Quality Management Plan (QMP) or instrument Standard Operating Procedures (SOPs).
Description:
Staff appear to be trained and proficient with the procedures they use to conduct their monitoring activities. However, it was noted that this training and/or demonstration of proficiency was not adequately documented.
Mendocino County AQMD stated that they operate under CARB's QMP and SOPs. Staff were not aware where electronic or hard copies of QMP or SOPs were, and there are no trainings or other mechanisms to ensure that staff understand the QA system as outlined in these documents.
References:
Recommendation to Address Finding:
MCAPCD should review CARB QMP and relevant SOPs (see http://www.arb.ca.gov/aaqm/qa/pqao/pqao.htm). MCAPCD should develop a formal system to ensure and document that all staff are familiar with the quality management system and are trained and proficient at the monitoring tasks that they are performing. MCAPCD should also ensure that field operators have access to information in relevant SOPs at the field station, either in hard copy or electronically.

Finding #	MEN2
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino – Network Management

Finding:
Mendocino County AQMD is listed as a PQAQ in AQS.
Description:
40 CFR 58.1 defines a PQAQ as “a monitoring organization or other organization that is responsible for a set of stations that monitor the same pollutant and for which data quality assessments can be pooled. Each criteria pollutant sampler/monitor at a monitoring station in the SLAMS and SPM networks must be associated with one, and only one, primary quality assurance organization.” Many requirements specified in 40 CFR 58, such as those for collocation, QAPPs, QMPs, and audits, are determined on a PQAQ basis.
Mendocino County AQMD is part of CARB’s PQAQ, and is not a stand-alone PQAQ.
References:
40 CFR 58.1
Recommendation to Address Finding:
Mendocino County should remove itself as a PQAQ from AQS. It may be a reporting or collecting agency, but CARB should be the PQAQ for data associated with Mendocino County AQMD.

Finding #	MEN3
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino – Field Operations

Positive Finding:
Stations visited in Mendocino County were well-maintained. Staff and the manager were professional and helpful, and very knowledgeable about the county and potential pollution sources. The station operator was proactive about troubleshooting instrument issues.
Description:
References:
Recommendation to Address Finding:
N/A

Finding #	MEN4
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino - Field Operations

Finding:

One-point QC checks (flow verifications) for PM₁₀ and PM_{2.5} are not consistently performed by MCAPCD site operators.

Description:

Mendocino site operators maintain “Maintenance and Service Log” sheets at each PM₁₀ and PM_{2.5} site. These include a line for monthly flow rate verifications. These are not regularly notated as having occurred. See picture below.



References:

40 CFR part 58 Appendix A, section 3.2.3. “Flow Rate Verification for Particulate Matter.”

Recommendation to Address Finding:

Conduct and log monthly flow rate verifications at each PM site every month.

Finding #	MEN5
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino – Field Operations

Finding:
MCAPCD logbook entries are not consistently made and are not always in the most defensible form. Handwritten notes are occasionally illegible due to water (rain) marks.
Description:
EPA recommends that logbooks be in the form of bound log books with numbered pages and with all entries initialed and made in indelible ink. Corrections should be made by drawing a single line through the information, initialing and dating. Information such as instrument down times should be included.
References:
Section 5 of the <i>QA Handbook</i> states that records supporting the operation of air monitoring measurement systems should be retained for at least three years or, if the records are part of any litigation, claim, negotiation, <i>etc.</i> , the records should be kept until the issue has been resolved.
Recommendation to Address Finding:
MCAPCD should create and follow a logbook entry convention to ensure thorough and defensible record-keeping. The records maintained by individuals should be periodically evaluated to ensure they are consistent, secure, regularly maintained, and (for electronic records) backed-up. MCAPCD should take steps to prevent water damage to entries or loss of information due to misplaced single log sheets.

Finding #	MEN6
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino - Field Operations

Finding:
Residence time calculations were not available at Mendocino County APCD's Ukiah, Gobbi site.
Description:
<p>The residence time is defined as the amount of time that it takes for a sample of air to travel from the opening of the cane to the inlet of the instrument. 40 CFR Part 58, Appendix E Section 9 states that for the reactive gases (O₃, NO₂, and SO₂) residence times must be less than 20 seconds. Additionally, it is recommended that the residence time within the manifold and sample lines to the instruments should be less than 10 seconds. The station technicians should calculate the residence time, document it in the station logbook, and periodically verify the data.</p> <p>There was not a clear record of residence time of the sampling lines at each site. Also, the site operators did not know how recently the residence time had been recalculated. At a minimum, the residence time should be calculated for each instrument after any change is made to the sampling train, such as the removal or addition of other instruments, and posted at each site.</p> <p>The station technicians should calculate the residence time, document it in the station logbook or other form available at the site, and periodically verify the data.</p>
References:
40 CFR Part 58, Appendix E Section 9
Recommendation to Address Finding:
MCAPCD should calculate residence times for all gaseous monitors. MCAPCD should modify sites with residence times in excess of 20 seconds, with a goal of 10 seconds, and evaluate any impact on compliance data due to excessive residence times. Residence times should be posted or accessible on-site.

Finding #	MEN7
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino - Field Operations

Finding:
Trees at Ukiah, Gobbi and Ukiah, Library sites in Mendocino County should be evaluated against siting requirements.
Description:
40 CFR Part 58, Appendix E, Section 5 states <i>“trees can provide surfaces for SO₂, O₃, NO₂ adsorption or reactions, and surfaces for particle deposition . . . to reduce this possible interference/obstruction, the probe, inlet, or at least 90 percent of the monitoring path must be at least 10 meters from the drip line of trees.”</i>
The tree drip line at Gobbi is coming close to the 10 m distance. The trees at the Library site appeared to meet siting requirements at the time of the TSA, but should be monitored over time.
References:
40 CFR Part 58, Appendix E, Section 5
Recommendation to Address Finding:
MCAPCD should verify that trees are meeting siting requirements, and check regularly.

Finding #	MEN8
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino - Field Operations

Finding:
The internal shelter thermostat is not operating correctly at Mendocino County APCD's Ukiah, Gobbi site and has not been addressed in a defensible fashion.
Description:
The Ukiah, Gobbi site operator determined that the internal shelter temperature is off by 4°, and is manually correcting the data. The issue and correction have not been formally documented.
References:
Recommendation to Address Finding:
The issue should be addressed using a Corrective Action form. The resolution should be defensible and well-documented. Data that could have been affected by erroneous temperature readings should be checked and flagged or invalidated if appropriate.

Finding #	MEN9
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino – Field Operations

Finding:
MCAPCD has no system for tracking and controlling station and instrument logbooks.
Description:
Field procedures require that logbooks be kept. However, these logbooks were not tracked, identified, and archived in a manner to ensure that the critical documentation they contain will be accessible and defensible.
References:
Recommendation to Address Finding:
MCAPCD should develop a standardized procedure for creating, labeling, and archiving logbooks.

Finding #	MEN10
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino – Field Operations

Finding:
Mendocino County AQMD should have formalized training requirements for new and existing staff.
Description:
<p>EPA appreciates Mendocino County’s efforts to participate in trainings when opportunities arise. However, the County does not have a formalized program to ensure that staff are trained on procedures and demonstrate proficiency on tasks directly related to their job functions.</p> <p><i>The QA Handbook, Section 4</i> discusses the need for a formalized training program. EPA recognizes that funding is limited and it is often difficult to send people to trainings. Developing a formalized training program can help agencies identify what trainings are needed, what the highest priority issues are, and what resources are available. If it is not possible to fulfill the training need immediately, the training plan allows agencies to look for future funding or other opportunities.</p> <p>EPA also encourages agencies to formalize and document on-the-job trainings. Trainings could be given by Mendocino County staff to their colleagues to provide common understanding and competency and minimize future problems and questions. In-house trainings could include information on the Envista program; training for site operators, data users, and data validators on AQS flags and why they are important; new QAPP/SOP training; data validation and analysis; instrument operation and maintenance training.</p> <p>EPA encourages MCAPCD to coordinate with CARB on trainings.</p>
References:
The QA Handbook, Section 4
Recommendation to Address Finding:
MCAPCD should develop a formal training program and tracking system to ensure that all staff and management are familiar with the relevant QAPPs and SOPs related to producing data in the field, data management and tracking, quality assurance, and all data systems. Training objectives develop proficiency in new staff, and give experienced staff the opportunity to keep skills current, to learn about emerging technologies and capabilities, and to ensure that all staff are familiar with the current QAPPs and SOPs.

Finding #	MEN11
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino – Data Management

Finding:
Mendocino County AQMD does not provide CARB AQAS with a dataset that is ready for upload to AQS. Mendocino County AQMD does not provide CARB AQAS with datasets that have been fully quality assured and ready for upload to AQS.
Description:
Mendocino County AQMD was unable to account for some data in AQS. For example, instances were observed where AQS was missing a data point, had a flag , or had a value when Mendocino showed a span check with no associated value. Mendocino gives CARB an AQS-formatted file with emailed notes. The local agency leaves it to CARB's discretion whether the emailed notes should result in flagged data. Mendocino County AQMD and other local agencies do not have a standard operating procedure (SOP) for conducting data review and validation, and does not check data after handing it over to CARB for entry into AQS.
References:
Recommendation to Address Finding:
MCAPCD and CARB should ensure that CARB, MCAPCD, and all local agencies have a data validation SOP. The SOP should include a procedure whereby the local agency checks any changes including flagging that CARB makes to the data, either before or after posting, as well as a procedure to discuss any issues the agency may have with the changes. The local agency should keep correspondence and data they send to CARB where it can be easily retrieved and reviewed. See Finding DM2.

Finding #	MEN12
Agency:	California Air Resources Board – Mendocino County AQMD
Date of Audit:	Summer 2011
Program Area:	Mendocino - QA Management

Finding:
Mendocino County AQMD does not use a formal corrective action system.
Description:
<p>Mendocino County AQMD's staff do a considerable amount of troubleshooting. Notes on what the initial problem was, what steps were taken to resolve the issue, and when the issue was first noted and when it was resolved are taken inconsistently and are kept in different locations.</p> <p>EPA quality management standards (EPA QA/R-2, Quality Improvement Section) require that management and staff "<i>ensure that conditions adverse to quality are</i>" prevented, identified promptly, fully defined, corrected, prevented from recurring, and documented as corrective actions which are tracked to closure. There is a corrective action process for the performance audit program. There should also be a formal, documented mechanism for elevating potentially significant corrective actions originating from the laboratory staff or field operators.</p>
References:
Recommendation to Address Finding:
Mendocino County AQMD should institute a formal corrective action process for actions originating from the laboratory or field.

Finding #	SJV1
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV - General

Positive Finding:
In general, the SJVAPCD monitoring program is robust and the agency staff and managers involved in the program are committed to the objective of producing high-quality, credible data.
Description:
Specific examples of good practices observed during this audit include:
<ol style="list-style-type: none"> 1. Management and staff at all levels are actively engaged in improving the program including monitoring systems and other data collection processes. 2. Staff and managers participated in the audit in a very professional and helpful manner. 3. Field operators are skilled and knowledgeable. 4. SJVAPCD provides their site operators with good hands-on training and frequent information sharing and issues communication via meetings every other Monday. 5. SJVAPCD is developing a new system for verifying zero air generators. 6. Currently, SJVAPCD implements three levels of independent data review and the process is well documented.
References:
Recommendation to Address Finding:
N/A

Finding #	SJV2
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV - QA Management

Finding:
SJVAPCD does not have an updated quality system documentation for all activities.
Description:
<p>A quality system is the means by which an organization manages the quality of the monitoring information it produces in a systematic, organized manner. It provides a framework for planning implementing, assessing and reporting work performed by an organization and for carrying out required quality assurance and quality control activities. While the monitoring staff at SJVAPCD is very knowledgeable and operates the ambient air monitoring network diligently, the lack of a structured quality system is needed to effectively and appropriately implement ambient air monitoring requirements. Major components of a quality system include:</p> <ul style="list-style-type: none"> • Quality Management Plans (QMP), Quality Assurance Project Plans (QAPP) and Standard Operating Procedures (SOP) • Independence of Quality Assurance • Data Quality Performance Requirements (Data Quality Objectives, DQOs) • Quality Control (QC) and Quality Assurance (QA) Activities
References:
<p>40 CFR 58 App. A 2.0, Quality System Requirements <i>QA Handbook for Air Pollution Measurement Systems, Volume II</i>, EPA-454/b-08-002</p> <p>40 CFR 58 App. A 2.1, Quality Management Plans and Quality Assurance Project Plans <i>QA Handbook for Air Pollution Measurement Systems, Volume II</i>, EPA-454/b-08-002</p> <p>Further guidance on developing QAPPs can be found in the guidance documents “<i>EPA Requirements for Quality Assurance Project Plans</i>,” EPA/240/B-01/003, March 2001, and “<i>Guidance for Quality Assurance Project Plans</i>,” EPA/240/R-02/009, December 2002</p>
Recommendation to Address Finding:
<p>SJVAPCD may adopt CARB’s Quality System documentation, develop their own, or adopt CARB’s with changes to match their program. Any deviation from the CARB QMP or QAPPs documentation must be formally approved by CARB as the lead agency in the PQAO.</p>

Finding #	SJV3
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV - Network Management

Finding:
SJVAPCD has experienced significant data losses at required monitoring sites, including sites critical for demonstrating compliance with the NAAQS.
Description:
There have been several recent examples of significant data loss due to downtime for temporary site closures for repairs and site relocations, including the Corcoran and Bakersfield-Golden State Highway sites. EPA agrees that the upgrades are necessary for safety and long-term longevity of a station, and that the site relocations in question were largely driven by circumstances beyond SJVAPCD's control. However, these modifications could be implemented in a manner that would minimize the amount of data loss, including better communication or the construction of temporary sites to cover data collection during site closure.
References:
Recommendation to Address Finding:
SJVAPCD should develop processes to ensure that routine site maintenance or unexpected site relocations do not compromise data completeness.

Finding #	SJV4
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV - Network Management

Finding:
SJVAPCD has initiated network modifications for several required sites without seeking EPA approval required by 40 CFR 58.14.
Description:
Monitoring agencies are required per 40 CFR 58.14 to seek EPA's approval for network modifications, including site closure or relocation. The request submitted to EPA must address how the criteria in 40 CFR 58.14 are met. Early communication between agencies is particularly crucial for high concentration or design value sites in order to develop acceptable plans for concurrent monitoring at the old and new sites in order to meet future data needs.
References:
40 CFR 58.14
Recommendation to Address Finding:
SJVAPCD should work with CARB and EPA to develop a plan for site closure or relocation that meets agencies' needs and federal requirements.

Finding #	SJV5
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV - Field Operations

Finding:
The residence time of flow between the inlet and each instrument was not posted at each SJVAPCD site.
Description:
<p>The residence time is defined as the amount of time that it takes for a sample of air to travel from the opening of the cane to the inlet of the instrument. 40 CFR Part 58, Appendix E Section 9 states that for the reactive gases (O₃, NO₂, and SO₂) residence times must be less than 20 seconds. Additionally, it is recommended that the residence time within the manifold and sample lines to the instruments should be less than 10 seconds. The station technicians should calculate the residence time, document it in the station logbook, and periodically verify the data.</p> <p>There was not a clear record of residence time of the sampling lines at each site. Also, the site operators did not know how recently the residence time had been recalculated. At a minimum, the residence time should be calculated for each instrument after any change is made to the sampling train, such as the removal or addition of other instruments, and posted at each site.</p> <p>The station technicians should calculate the residence time, document it in the station logbook or other form available at the site, and periodically verify the data.</p>
References:
40 CFR Part 58, Appendix E Section 9
Recommendation to Address Finding:
SJVAPCD should calculate residence times for all gaseous monitors. SJVAPCD should modify sites with residence times in excess of 20 s, with a goal of 10 s, and evaluate any impact on compliance data due to excessive residence times. Residence times should be posted or accessible on-site. Each time a modification is made to the sampling train, the residence time should be recalculated and posted..

Finding #	SJV6
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV – Field Operations

Finding:
Some SJVAPCD site logbooks lacked specific information about the date or type of maintenance performed, or on which instrument.
Description:
<p>In general, documentation needs to demonstrate that data are of adequate quality and any unusual circumstances are documented and explained. Documentation of the activities occurring at monitoring stations should be consistent throughout the network and should, at a minimum, include all repairs, calibrations, audits, or other maintenance performed. Maintaining logbooks consistently will help to develop a comprehensive history of the station. This will aid field technicians to pinpoint and assess problems that may arise with the station and provides information crucial for data validation.</p> <p>Overall documentation at sites was generally thorough; however, EPA noted that more specifics could be included consistently in logbooks at the site. For example, an entry noting that maintenance was performed on a certain date should identify the instrument and either what specific activities were performed or where that information can be found. Currently, SJVAPCD does not have a standard system in place to ensure consistency of documentation.</p> <p>Standardizing logbook entries to include the following may be helpful. This could include:</p> <ul style="list-style-type: none"> • Date, time and initials of the person(s) who have arrived at the site • Visitors • Brief description of the weather (e.g., clear, breezy, sunny, raining) • Brief description of exterior of the site. Any changes that might affect the data should be recorded – for instance, if someone is parking a truck or tractor near the site, this may explain high NO_x values • Any unusual noises, vibrations, or anything out of the ordinary • Records of any station maintenance or routine operations performed • Description of the work accomplished at the site (calibrated instruments, repaired analyzer) • Dates that instrumentation were repaired or changed out and serial numbers of replacement instruments • Detailed information about the instruments that may be needed for repairs or troubleshooting • Other pertinent information recorded in other logbooks
References:
QA Handbook Volume II, Section 11.2.3, Instrument and Site Logs
Recommendation to Address Finding:
SJVAPCD should have a more consistent policy on what station operators enter into the station

logbook, including routine maintenance, instrument repair, audits and calibrations, and logbook closeout comments. Logbooks should be routinely reviewed to ensure that pertinent information is being recorded.

Finding #	SJV7
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV - Field Operations

Finding:
There is no documentation of management review of station logbooks and other site activities for SJVAPCD operated sites.
Description:
The monitoring manager plays a very active role in quality control of the work from his staff by extensive oversight including in-person site visits and checks of log books and maintenance sheets. This practice is very useful and should be well-documented by initialing the site logbook or maintenance sheet, indicating the span of what was reviewed. Also, if the vacant position of senior technician were filled, that person could assume some of the responsibilities currently assumed by the manager, including this oversight role.
References:
Recommendation to Address Finding:
The SJVAPCD monitoring manager or senior technician should initial logbook or maintenance sheet and indicate what dates were reviewed.

Finding #	SJV8
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV - Field Operations

Finding:
SJVAPCD site operators do not have a quick visual way to identify changes in instrument performance or QC checks that would indicate instrument issues or the ability to remotely check on data or site operations.
Description:
The SJV monitoring network covers a large geographic area, so identifying efficiencies for site operators in their routine site maintenance is critical for resource management. Operators spend a large amount of time reviewing data for data verification. Providing means for remote access to real-time site data or instrument meta-data could help identify priority issues and make the operator's trips to the sites more efficient. Visual tools to track instrument performance or QC checks could also reduce the amount of time needed for level 1 data validation review. The district is currently developing a data management system, and should consider the potential benefit of having a system capable of remote access and different types of data visualization.
References:
The use of control charts to monitor quality control parameters is recommended in the <i>QA Handbook for Air Pollution Measurement Systems, Volume II, Ambient Air Quality Monitoring Program</i> , December 2008.
Recommendation to Address Finding:
As SJVAPCD develops new tools for data access and review, it should include considering the use of control charts to track long-term performance of the instruments.

Finding #	SJV9
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV – Field Operations

Finding:
SJVAPCD experiences data loss due to instrument malfunction.
Description:
Even though routine maintenance and calibrations are scheduled to minimize downtime, significant amounts of instrument downtime still results from running instruments beyond the expected life cycle, for example, past the time when support from the manufacturer is available.
References:
Recommendation to Address Finding:
SJVAPCD should budget for equipment replacement according to the expected lifecycle of the monitor and have backup instrumentation ready for field deployment in the case of a prolonged instrument breakdown.
SJVAPCD should also compile a list of equipment replacement needs and share the list with EPA in the event that equipment replacement funds become available.

Finding #	SJV10
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV – Data Management

Finding:
It is unclear whether SJVAPCD is using appropriate criteria to invalidate or flag PM ₁₀ data.
Description:
SJVAPCD has a thorough, multi-level data validation process, but it is unclear that appropriate criteria are being used to invalidate or flag data, specifically for the case of continuous PM data. Standard data review and validation procedures should be documented in a detailed manner, including the criteria used to flag and invalidate data.
References:
<i>Guidance for Preparing Standard Operating Procedures (QA/G-6) EPA600/B-07/001/April 2007.</i>
Recommendation to Address Finding:
SJVAPCD should develop step-by-step instructions for data review and validation in SOPs or QAPPs, including specific criteria for appropriate flagging of data.

Finding #	SJV11
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV - Data Management

Finding:
SJVAPCD experiences significant resource inefficiencies for staff and management as the current data management system relies solely on manual inputs.
Description:
While SJVAPCD's current three-level data review process is very thorough, performing this process entirely by hand is inefficient and very time-consuming. Implementing a new data management system should decrease the amount of time needed for this task and free up much-needed resources. In developing a new system, EPA encourages the participation of all involved in the current review process, as well as outreach to other monitoring agencies that have recently developed these systems, to ensure that any system under consideration encompasses all necessary features.
References:
Recommendation to Address Finding:
SJVAPCD should continue to work on upgrading the data management system and work with EPA to identify the components that are necessary for accomplishing the District's monitoring program goals.

Finding #	SJV12
Agency:	California Air Resources Board – San Joaquin Valley APCD
Date of Audit:	Summer 2011
Program Area:	SJV - QA Management

Finding:
SVJAPCD does not have a formal corrective action process in place.
Description:
EPA quality management standards (EPA QA/R-2, Quality Improvement Section) require that management and staff “ <i>ensure that conditions adverse to quality are</i> ” prevented, identified promptly, fully defined, corrected, prevented from recurring, and documented as corrective actions which are tracked to closure.
While corrective action seems to be currently occurring in a timely fashion for most issues, a formal corrective action process would serve as documentation for the issues being resolved, capture the process and keep it consistent through staff or management turnover, and distribute results of the corrective action to staff.
References:
EPA QA/R-2, Quality Improvement Section
Recommendation to Address Finding:
SVJAPCD should institute a corrective action process to provide a formal, documented mechanism for elevating potentially significant corrective actions originating from field or data review operations.

APPENDIX A: SUMMARY OF FINDINGS

G1: [Previous Finding M1] CARB needs to complete the process of putting a formal PQAO into place.

G2: QA does not have the structure and staff to manage QA oversight of the PQAO districts.

G3: [Previous Finding M6] While progress has been made on updating the CARB QA Manual with a QMP and QAPPs or equivalent documents, the process is behind schedule and is not moving forward.

G4: Local districts within the CARB PQAO do not always have updated quality system documentation for all activities.

G5: [Previous Findings QM1 and M3] QA Authority and interactions between QMB and the other Branches should be expanded and formalized. The corrective action system should be developed to include actions taken in addition to reports issued by the QA auditors and the calibration laboratory.

G6: Coordination between CARB and districts (e.g., Imperial County, SJV, and Mendocino County) and EPA needs to be improved.

NM1: Not all agencies within the PQAO have an approved network plan. The current network plan process does not allow determination of network adequacy.

NM2: The network assessment does not meet all CFR requirements.

NM3: There are PM₁₀ monitors listed in local conditions (LC; parameter code 85101), but not Standard Temperature and Pressure (STP; parameter code 81102) in AQS.

FO1: [Related Previous Findings GB3, SJV3, & NS2] Documentation at the CARB field sites is inadequate and not reviewed by management.

FO2: Management oversight of site operators needs strengthening.

FO3: CARB field operators have not been trained on new SOPs.

FO4: Residence time calculations were not available at all CARB sites visited.

FO5: Delay in sending PM_{2.5} samples has resulted in loss of data.

FO6: Samples that CARB intends to be used as “make up” samples are not being taken in accordance with EPA guidance.

FO7: PM₁₀ QC checks are not consistently recorded. There is no document in which field operators are directed to record this information.

FO8: CARB field staff do not check data after sending information to the CARB offices.

FO9: The Yuba City site has several significant siting issues that need to be resolved.

FO10: Records indicate that calibrations of gaseous pollutant instruments are not consistently done according to a schedule.

FO11: [Previous Finding AQSB7] The number of NO₂ titration points taken during calibration does not meet regulatory requirements.

FO12: Multi-point calibrations of PM_{2.5} instruments are not done routinely.

FO13: [Previous Finding AQSB8] AQSB is not formally documenting the quality of zero air being used in the program.

FO14: Span and precision gases used in the field are not being calibrated routinely.

FO15 QA#: Mass flow elements (MFEs) are used to establish calibration points outside of their calibrated range.

FO16: Instruments replaced on the field are not always efficiently tracked and returned to the repair laboratory facility for diagnosis, repair, and reuse. This can result in loss of data due to unavailability of spare instruments (e.g. Sutter Buttes summer 2011).

FO17: CARB is working to improve communication with field staff.

FO18 (Positive): CARB maintains a well equipped stockroom of spare parts, maintains a large equipment purchase order history, and develops thorough equipment testing procedures that are regularly updated.

DM1: The data validation and review/verification procedures for CARB, including AQSB, NLB, and AQAS are not formally published in a control-copied SOP.

DM2: [Previous Finding M7] Data within the CARB PQAO are not validated using consistent procedures. (See Findings SJV9, IMP10, and MEN11)

DM3: [Previous Finding DM5] The CARB Air Quality Analysis Section (AQAS) does not ensure that local district data are validated prior to upload to AQS.

DM4: Erroneous continuous data were identified in AQS for CARB sites.

DM5: Erroneous continuous data were identified in AQS for non-CARB sites within the CARB PQAO.

DM6: [Previous Finding DM6] There are numerous deficiencies in the data certification process for the CARB PQAO, including:

- Not all NAAQS-compliant data within the CARB PQAO are routinely certified.
- Data certified by CARB for local districts is not reviewed by CARB and is often not validated.

Data are routinely certified by agencies within the State of California but responsibility has not been formally delegated to any local agencies within the State of California.

DM7: Data, including those for design value sites, have been changed after they are certified and not recertified.

DM8: Some local districts within the CARB PQAO are listed as their own PQAO in AQS.

DM9: CARB altered data collected by local districts without communicating with the district.

QA1: The QA Audit group has made an effort to improve its documentation process, however several inconsistencies were noted.

QA2: The audit trailer evaluated was using one expired gas cylinder and others that had not been certified annually as required for the EPA National Performance Audit Program (NPAP).

QA3: The QA Section is not tracking to ensure that 25% of monitors are being audited per calendar quarter.

QA4: The connection to the inlet on the audit trailer could pull in outdoor air.

QA5: Auditors do not review all applicable siting information in AQS prior to an audit.

QA6: [Previous Findings M4 & OPA2] Quality assurance for special projects is not developed in a process consistent with EPA quality system requirements.

PM1: Communication of post-weigh information and transmission of documentation to local districts could be improved.

PM2: The PM Laboratory does not have a formal corrective action process for addressing issues with PM filter collection.

PM3: Documentation of activities in the PM₁₀ and PM_{2.5} Laboratories could be improved.

PM4: PM₁₀ trip blanks are not being used to assess potential bias from filter transport and handling.

TL1: The canister cleaning SOP does not reflect the current cleaning procedure in use, including the number of cleaning cycles for a newly acquired cleaning system, where the number of cycles has been reduced from nine, as stated in the SOP, to five.

TL2: An SOP is not documented for the batch certification of cleaned canisters. The canister cleaning SOP lists cleaning criteria for the MLD 058 method, but not for the MLD 066 method.

TL3: The batch certification of cleaned canisters described by staff for methods MLD 058 and MLD 066 differs from existing VOC guidance in that one cleaned canister of twelve is tested for residual contamination as part of the certification process.

TL4: [Previous Finding 19]. Pre-cleaning concentrations are not recorded in a logbook to allow for the selection of the most highly contaminated canister for batch certification.

TL5: Canisters are not routinely leak tested as prescribed in guidance. Instead, canisters are vacuum leak tested only when gross leaks are suspected.

TL6: [Previous Finding 21]. A retention time policy for re-cleaning and blanking canisters once they have been certified clean has not been established. The Canister Custodian confirmed that she observes reappearance of contamination in cleaned canisters over time.

TL7: The CARB SOP states that old canisters are reconditioned, but is inconsistent with practice.

TL8: CARB has not established a holding time for cartridges once samples have been collected for extraction or analysis.

TL9: The laboratory does not assign expiration dates to new sampling cartridges and allows cartridges to be used beyond the 90 days prescribed by the method.

TL10: CARB's procedure for analyzing DNPH lot blanks differs from the SOP.

TL11: No criterion is provided in the CARB SOP for passing DNPH lot cartridge blanks.

TL12: Gloves are not worn as a contamination protection measure when handling cartridges. A nitrogen-purged glove bag is not used for extractions.

TL13: [Previous Finding OL3] Staff stated that field blanks are not being analyzed at a frequency of 10% of field samples, as specified in Method TO-11, nor is there an SOP describing the procedure for the submission of field blanks.

TL14: CARB does not analyze trip blanks.

TL15: Method TO-11 states that samples should be re-analyzed when results are 10 % above the criterion, but the analyst was not aware of this criterion.

TL16: Working standards are tracked and used for six months, differing from the CARB SOP, which states that standards should be retained for four months under refrigeration.

TL17: Site name and sampling dates are recorded on a piece of tape loosely stuck to sample cartridges, with labels occasionally falling off, causing difficulty in identifying samples.

TL18 (Positive): Data undergo peer review, supervisory review, review by the Branch Chief, and a final review before going to AIRS.

TL19: [Previous Finding OL5] There is no secondary review of logbooks.

TL20: CARB does not analyze audit samples or through the probe audit samples as suggested in Sec. 9.7 of the CARB SOP.

TL21: Appendix V in the CARB SOP lists the standards that were used in 2003 and has not been updated to reflect the standards currently being used.

TL22: CARB does not analyze audit samples or through the probe audit samples as suggested in Sec. 9.7 of the CARB SOP.

IMP1: The ICAPCD ambient air monitoring program is not operating under an approved QAPP.

IMP2: Imperial County APCD has not established an appropriate quality system for ambient air monitoring.

IMP3: Assessment of PM₁₀ or PM_{2.5} sampling frequency throughout the Imperial County network has not been performed as required.

IMP4: Neighborhood scale may be inappropriate for PM₁₀ at the Westmorland site.

IMP5: One-point flow rate verifications for PM₁₀ and PM_{2.5} are not performed by ICAPCD as required and are not well documented.

IMP6: Residence time for gaseous monitors operated by ICAPCD is not established.

IMP7: ICAPCD is internally post weighing high-volume PM₁₀ filters without proper PM lab or quality control measures.

IMP8: Documentation of ICAPCD air monitoring activities is not complete.

IMP9: There are potential siting issues at the Calexico Ethel site.

IMP10: ICAPCD is not adequately reviewing and editing data.

MEN1: MCAPCD staff were not familiar with the Quality Management Plan (QMP) or instrument Standard Operating Procedures (SOPs).

MEN2: Mendocino County AQMD is listed as a PQAO in AQS.

MEN3 (Positive): Stations visited in Mendocino County were well-maintained. Staff and the manager were professional and helpful, and very knowledgeable about the county and potential pollution sources. The station operator was proactive about troubleshooting instrument issues.

MEN4: One-point QC checks (flow verifications) for PM₁₀ and PM_{2.5} are not consistently performed by MCAPCD site operators.

MEN5: MCAPCD logbook entries are not consistently made and are not always in the most defensible form. Handwritten notes are occasionally illegible due to water (rain) marks.

MEN6: Residence time calculations were not available at Mendocino County APCD's Ukiah, Gobbi site.

MEN7: Trees at Ukiah, Gobbi and Ukiah, Library sites in Mendocino County should be evaluated against siting requirements.

MEN8: The internal shelter thermostat is not operating correctly at Mendocino County APCD's Ukiah, Gobbi site and has not been addressed in a defensible fashion.

MEN9: MCAPCD has no system for tracking and controlling station and instrument logbooks.

MEN10: Mendocino County AQMD should have formalized training requirements for new and existing staff.

MEN11: Mendocino County AQMD does not provide CARB AQAS with a dataset that is ready for upload to AQS.

MEN12: Mendocino County AQMD does not use a formal corrective action system.

SJV1 (Positive): In general, the SJVAPCD monitoring program is robust and the agency staff and managers involved in the program are committed to the objective of producing high-quality, credible data.

SJV2: SJVAPCD does not have an updated quality system documentation for all activities.

SJV3: SJVAPCD has experienced significant data losses at required monitoring sites, including sites critical for demonstrating compliance with the NAAQS.

SJV4: SJVAPCD has initiated network modifications for several required sites without seeking EPA approval required by 40 CFR 58.14.

SJV5: The residence time of flow between the inlet and each instrument was not posted at each SJVAPCD site.

SJV6: Some SJVAPCD site logbooks lacked specific information about the date or type of maintenance performed, or on which instrument.

SJV7: There is no documentation of management review of station logbooks and other site activities for SJVAPCD operated sites.

SJV8: SJVAPCD site operators do not have a quick visual way to identify changes in instrument performance or QC checks that would indicate instrument issues or the ability to remotely check on data or site operations.

SJV9: SJVAPCD experiences data loss due to instrument malfunction.

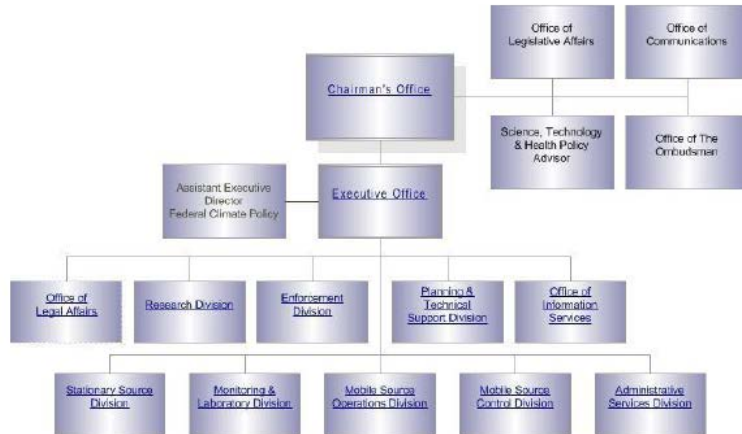
SJV10: It is unclear whether SJVAPCD is using appropriate criteria to invalidate or flag PM₁₀ data.

SJV11: SJVAPCD experiences significant resource inefficiencies for staff and management as the current data management system relies solely on manual inputs.

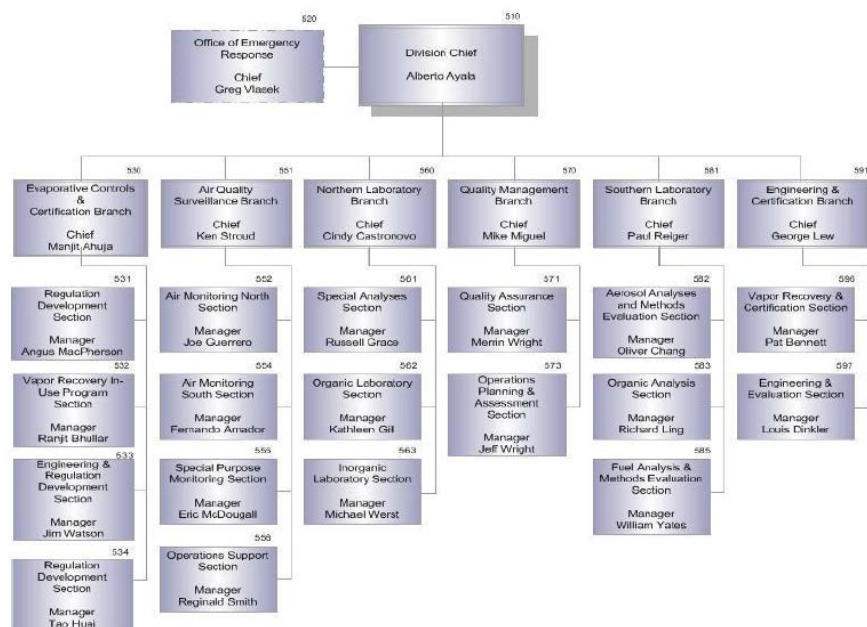
SJV12: SVJAPCD does not have a formal corrective action process in place.

APPENDIX B: CARB ORGANIZATIONAL CHARTS

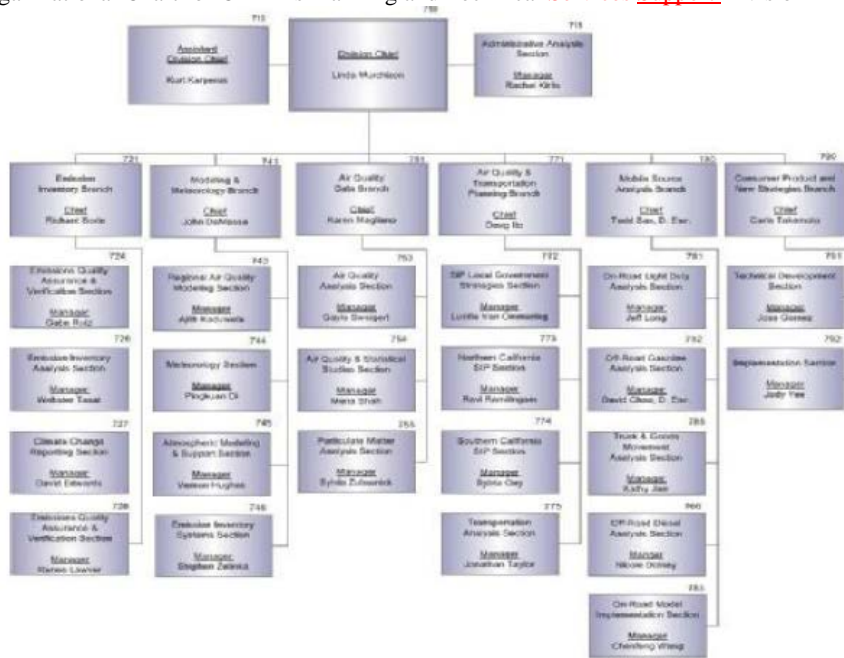
Organization of CARB's Divisions and Offices



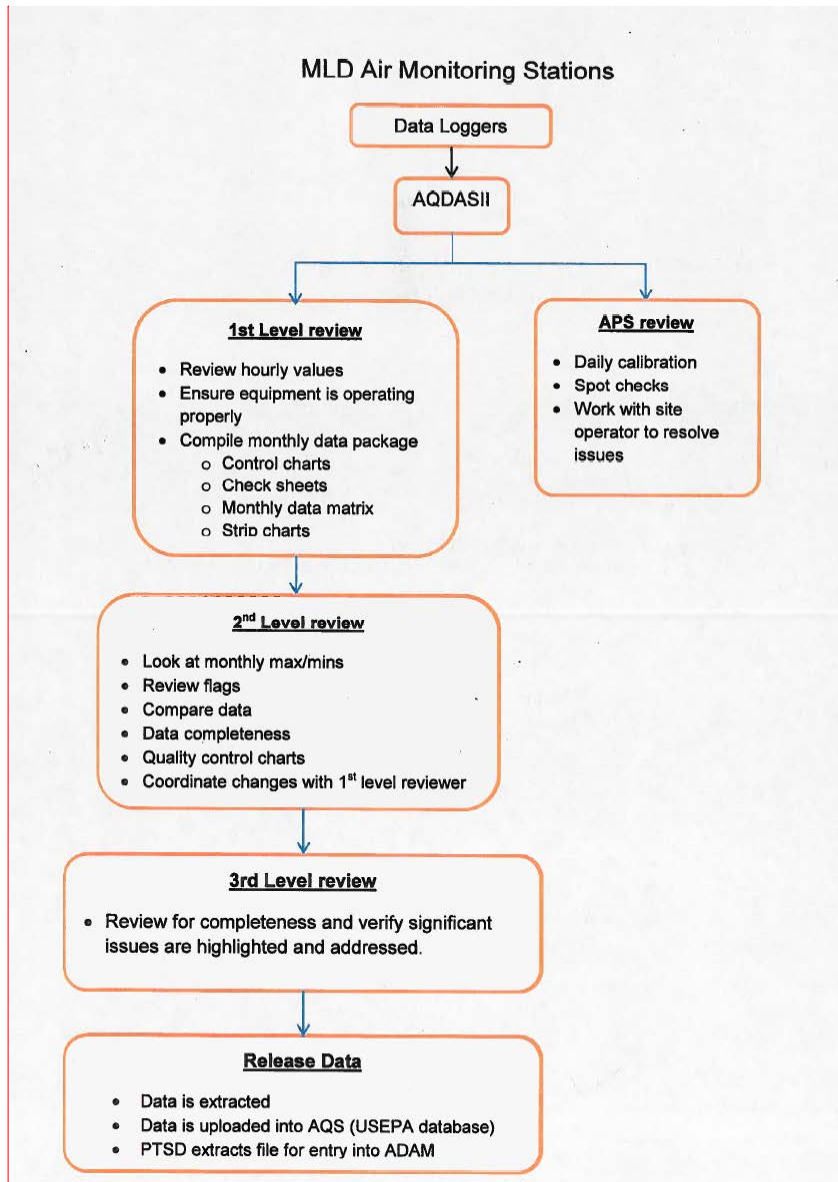
Organizational Chart for CARB's Monitoring and Laboratory Division (MLD)



Organizational Chart for CARB's Planning and Technical ~~Services~~ Support Division



APPENDIX C: CARB DATA VALIDATION DOCUMENTS



Comment [A51]: Please reference appropriate document

Data Review

Hard copy data sheets, station check sheets and strip charts are submitted by the field techs to the 2nd level reviewer.

A review is made of each data packet submitted from the station operators. The packets are checked for completeness, correctness and calibration and station check dates. See attached "Date Review – Charts & Second Level review", " System Manager Instructions" and "2nd Level Review of Air Quality and Met Data" for more specifics.

Data Correction

Corrections to the data by the 1st level reviewer are made within system manager. If errors are found by the 2nd level reviewer before submittal to AQS, the corrections are also made within system manager. Corrections after submittal to AQS are made by the 2nd level reviewer within AQS. Some avenues for correction of data already submitted to AQS are through Air Quality Data Action Requests, some corrections (or review requests) may come back from PTSD after review of the data on the ADAM data base, exceptional event requests from PTSD, etc.

2nd Level Review of Air Quality and Met Data

Monthly Max/Mins

- Is the max greater than or equal to the level of the State Ambient Air Quality Standard (SAAQS)?
- Is the monthly max valid?
 - Is the max typical for the time of year?
 - Is the diurnal profile reasonable?
 - Are there no large jumps in concentrations from one hour to the next?
 - Is the hour of daily max typical?
 - Is the day complete?
 - Is the max a calibration point?
 - Is the max impacted by a source or unusual condition?
- Is the range between the min and max reasonable?
- Are the indoor temperatures within range for proper operation of all samplers?

Flags

- Are the flags reasonable?
- Do they match the comments on the monthly check sheet?
- Are any flags missing?
 - Calibrations
 - Power outages
 - Equipment failure

Compare data parameters at the site?

- Do CO, NO, NO₂ and NO_x concentrations track each other?
 - CO and NO usually increase and decrease together
 - NO₂ + NO should be equal to or less than NO_x
 - High concentrations of NO and ozone do not occur at the same time
- Is the PM₁₀ greater than the PM_{2.5}?

Quality Control Charts

- Are the control charts within range?
- If not, what corrective actions have been taken?
 - The data should be deleted or adjusted?

Data Completeness

- Can the data gaps be explained?
- Why are there data gaps, does it affect data completeness?

Maintenance Check Sheets

- Are the monthly check sheets complete?
- Are the dates valid for certifications and calibrations?
- Was all maintenance completed and noted?
 - Leak checks passed?
 - Filters changed?
- Initial each check sheet for verification of review

Data Review – Charts & Second Level review

1. Make sure all data sheets and monthly maintenance checks for the site are included – you can check the log in sheet to find out what is expected.
2. Make sure the monthly calibration control charts are included for the criteria pollutants.
3. Make a note of any new or discontinued parameters on the log in sheet.
4. Put the data sheets in the following order – CO, O3, NO2, NO, NOx, BAM, Met, etc. Place the monthly calibration control chart on top of the data sheets.
5. Do the same with the monthly maintenance sheets and place after the data.
6. Review the data – look at high/low values for the month. Scan the data for spikes or dips. Check the data flags and review them on the system manager to make sure any omitted data has been flagged properly. Check any suspicious BAM data against data on s:drive. Confirm BAM data has been downloaded onto the S drive for all sites reporting BAM. Check inside temperature to make sure it is within specs for all instruments reported. Note: some sites submit a hard copy of the downloaded BAM data which should also be kept with the data packet.
7. Review the maintenance check sheets. Scan the values for the month making sure there are no jumps or dips – look at the completeness and notes, make sure notes are reflected on the respective data sheet. Initial and date each data sheet and check sheet.
8. Review strip charts – look for any abnormalities in the trace. Confirm any notes corresponding with reported data. Look at daily cals making sure they don't overlap into a reported data value.
9. When reviews are complete add a note to system manager on one parameter for each site stating "(date) – 2nd level review performed by (name)".
10. Keep strip charts and turn in the data/maintenance check sheets to Joe Guerrero for a final review. Joe reviews the data then turns it in to Ken Stroud for approval. Ken returns the data sheets for entry into AQS. He will note any changes, comments, or withhold any data not ready for entry into AQS.

AQS Data Entry

1. In Internet Explorer go to the AQS website at:
www.epa.gov/ttn/airs/airsaqs/aqsweb/aqswebhome.htm
2. Choose option from Launch Applications – Proceed to AQS
3. Click on – I agree to these terms and want to enter the AQS application.
4. Enter your AQS Username and password. The database is: AQSPROD
5. Click on the Screenin g Group Access circle, then choose California 2 (highlights blue) – click on OK
6. Click on Batch at top menu bar
7. To transfer files into AQS:
 - Click on CDX

- Enter your AQS username and password, click on Login
- Click on AQS: Air Quality System – File Transfer
- Click on SELECT
- Select the directory containing your files i.e. S:/AQS/todo/2005/
- Highlight the files you wish to load into AQS
- Click Open – the files are copied to the file area on AQS
- Click SEND
- Click Exit Webform or the X on the top right of the web form screen to close the AQS File Transfer Screen

8. Load files from CDX onto the AQS database

- a) Highlight the file name on the CDX file list
- b) Click on Load File – Batch submission box comes up – click OK – the system status box displays the status of the job submitted – wait until active changes to completed (click refresh to update status)
- c) Run the Stat CR job
- d) View the Scan report
- e) Review and/or correct any errors
- f) Run Post

9. After data entry into AQS is complete, retrieve precision data for files submitted via AQDAS <http://146.114.111.207/p+a.php>

10. Use CDX procedure to transfer the files onto the AQS database

11. Enter the Precision data files into AQS using the Load procedures

Data Storage

1. Collect data sheets, maintenance sheets and strip charts together
2. Sort by site
3. File in archive boxes by site name
4. Store boxes on site for 4 years
5. After 4 years send to Broadway storage for an additional 3 years.

System Manager Instructions

1. Receive data from techs.
 - Review data sheets, check sheets, and strip charts – look for high values, repeating values, any data anomalies. Make sure there are check sheets for each parameter reported, and check any comments against data sheet and strip chart. Check data sheet against data on system manager to make sure all flags are on system manager. Initial check sheets, and add note to system manager that 2nd level review is complete. Page through strip charts doing an eyeball scan of data, check for days and if missing make sure it is noted why, check to make sure they are from the correct site.
2. Retrieve data from system manager to create AQS data files to be entered into AQS.
 - Log data onto logsheet. Log onto system manager. Click 'US EPA Import-Export'. Click 'Create AIRS files'. Scroll to site being created, click on the site ID and click on each parameter to be downloaded onto file. (Be sure the parameters being created are on the site log sheet. If the site includes new parameter(s), you will need to make sure they are added to AQS before the data will be accepted. Also, there are some parameters for a few sites that are not to be reported. The log sheet has the reported parameters highlighted.) After selecting all appropriate parameters, click on and enter the 'Begin Date' and 'End Date'. Next, enter an appropriate file name to be added to the shared AQS directory. Check box 'Add to EPA log file', and click 'OK'. When complete, click on 'EPA log file', scroll to the end and make sure the correct site/dates were created. Click 'Export File'. (To deselect parameters, click on 'None' and 'End Selection' then click on the site again)
 - When creating NO₂, you must click on 'File Add-Subtract Utility' to create the NO₂ data before clicking on 'US EPA Import-Export'. Click on 'Station' and scroll to and click on the appropriate station ID. Click on '1st Parameter' and select 'Nox', click 'minus', then click '2nd Parameter' and select 'NO', click 'Store As' and select 'NO₂', next select appropriate 'month and two digit year'.
3. You are now ready to export the data files to AQS.